



16 Dec. 1979

Dear Hildegard,

Janine Firpo, a Zoology grad. student here, will hand carry the Unia slabs to Calif. on Wed. She goes first to S. Fr. and will be in L.A. btwn. 28th Dec. & 4 Jan., & will leave them w/ Whistler at the Mus. downtown. Sorry that it has taken so long. They were misplaced during re-arranging the coll.

If you don't go down to the Mus. regularly, perhaps Ken could pick them up & take them to you. He wants to talk to you ^(about something else) anyway, so it shouldn't be any problem.

Diana & I were going to photograph the slabs with bones of U. aalge californica laid out in the depressions. but we have been too moved

under with the end of the term.

If the Mus. feels they can make ^{rubber} molds without damage it is O.K., but I would want 2⁺ copies.

Ken said he could hand-carry the slabs back here

To wish you
all the joys
of the holiday season,

whenever you finish with them. They are from Sisguac Fm., Johns Manville quarry near Lompoc.

Merry Christmas to you and Henry,

p.s. Pierre (a student of Jonathan Becker (a student of John White)) is applying here for next fall to work with me. He has been corresponding

with me for a year & I met
him at the SUP in Pittsburgh
last month. Real promising
student. John W. & Chuck
Trost (a former ^{W.S.} student of
mine) think highly of him.

Xerox of Uma brooksii paper
as submitted — and accepted —
by So Cal Acad Sci. for
#1 of vol. 1981 probably in
summer as #s 2 & 3 of 1980
have been slow in printing.

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A New Species of Murre, Genus Uria,
From the Late Miocene of California (Aves:Alcidae)

Hildegarde Howard

Abstract.--A new species of murre, genus Uria, from the late Miocene of California (Aves:Alcidae) by Hildegarde Howard, Bull. Southern California Acad. Sci., 80(1): ,1981. A new species of murre, Uria brodkorbi, is represented by impressions of the skull and incomplete skeleton of one individual on two slabs of diatomite from the late Miocene Sisquoc Formation, exposed near Lompoc, California, U.S.A. This is the seventh species of fossil bird to be described from this formation. Uria brodkorbi is very similar morphologically to the Recent Uria aalge that is common along the California coast today, but differs in being of heavier build and having a shorter beak, a stronger sternum and more massive wings.

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Introduction

A previously unrecorded fossil bird specimen from the diatomite deposits of the Sisquoc Formation near Lompoc, California, was recently made available to me for study and description through the generosity of Dr. Pierce Brodkorb, of the University of Florida. The new fossil consists of the impressions of the skull and the anterior elements of the skeleton on two contiguous slabs of diatomite; it represents a new species of murre, family Alcidae.

Six species of marine birds were described from the same late Miocene deposits at Lompoc by Miller (1925). These include three species of the booby-gannet family (Pelecaniformes: Sulidae): Miosula media, Sula willetti and Morus lompocanus; a shearwater (Procellariiformes: Procellariidae), Puffinus diatomicus; a godwit (Charadriiformes: Scolopacidae), Limosa vanrossemi; and an auklet (Charadriiformes: Alcidae), Cerorhinca dubia, of smaller size than the alcidspecimen now at hand and related to the puffins rather than to the murre.

Although the number of fossil bird specimens collected from the Sisquoc Formation has nearly doubled since the time of Miller's report (1925), no additional species have been described from the deposits. The holotypes and many of the referred specimens are in the collections of the Museum of Paleontology at the University of California, Berkeley. The others are in the Natural History Museum of Los Angeles County and the California Academy of Sciences. Most of the approximately 20 avian specimens now known from these deposits are skeletal imprints in diatomite with no bones remaining. One specimen, assigned to Cerorhinca (LACM 74068) dubia, retains badly fragmented wing bones.

The specimen now at hand is in the collection of Dr. Pierce Brodkorb (PB 7960). It was acquired by Dr. Brodkorb many years ago under a Cooperative Agreement with the Florida State Geological Survey. Dr. Brodkorb was unable to learn particulars regarding the collection of the specimen. The label data read, "Sisquoc Formation, Santa Barbara Co., Cal. Diatomaceous earth quarries in this area. Johns Manville Co."

Photographs of PB7960 viewed in certain lights cause the image of the impressions to be reversed, so that the skeletal elements appear in relief (Figs. 1 and 2). In this aspect the skeleton so closely resembles that of the present-day murre, genus Uria, that had the deposit been of Pleistocene age, the specimen might have been identified as the Common Murre, Uria aalge, that is found along the California coast today. More detailed study, however, reveals important differences. Therefore, a new species is here described.

Methods and Materials

In order to observe more closely the details of the skeleton of this fossil murre, latex molds were made of the impressions in the diatomite. Two sets of molds were prepared, each made directly from the slabs in an effort to assure maximum accuracy of detail. One set remains with the holotype, the other is in the cast collection of the Natural History Museum of Los Angeles County. Although the skeletal impressions in the diatomite slabs were checked for measurements, the actual study of the specimen was based largely on the latex molds.

Abbreviations.-- The following acronyms are used for specimens cited in the text: ANSP, Academy of Natural Sciences, Philadelphia; CSULB, California State University, Long Beach; LACM, Natural History Museum of Los Angeles County; PB, Pierce Brodkorb collection; USNM, National Museum of Natural History, Smithsonian Institution.

Bone terminology follows Howard (1929).

Comparative material.--Recent: Complete skeletons of Uria aalge californica (17), U. a. inornata (6), U. lomvia lomvia (2, one lacking complete skull), U. l. arra (10), from the collections of CSULB, LACM and PB. Also disassociated elements of Uria spp. from Aleut middens in Amchitka, Alaska (CSULB): 48 humeri, 45 coracoids and 36 carpometacarpi. With the exception of the genus Alle, specimens representing all other North American genera of Alcidae were also compared.

Fossil: Uria antiqua (Marsh 1870), cast of holotype humerus (ANSP 13357); Uria affinis (Marsh 1872), cast of holotype humerus (ANSP 13358); Australca cf. grandis Brodkorb 1955, proximal and distal ends of humeri (USNM 192758 and 178136) and ulnae (USNM 193326 and 2156⁵₂, complete coracoid (USNM 215513) and proximal end of carpometacarpus (USNM 215906) from the Lower Pliocene Yorktown Formation, Lee Creek, North Carolina; Miocepheus cf. mcclungi Wetmore 1940, humerus (USNM 25668) from the Middle Miocene Calvert Formation, Maryland; ?Uria sp., proximal end of humerus (LACM 52018) from the late Miocene Monterey Formation, Orange County, California.

Systematics

Class Aves Linnaeus 1758

Order Charadriiformes (Huxley 1867)

Family Alcidae Vigors 1825

Subfamily Alcinae (Vigors 1825)

Genus Uria Brisson 1760

In the fossil specimen from Lompoc, as exposed on the diatomite slabs and shown in the latex molds, the following characters shared with Uria, Alca and Pinguinus (genera that Storer (1960) groups together in the tribe Alcini) are observable: sharply ridged temporal fossa of the cranium, carpometacarpus with long process of metacarpal I, and humerus with depressed, ovoid pectoral attachment and with external tuberosity projecting anteriorly.

The straight beak and well developed wing elements immediately distinguish the fossil specimen from Pinguinus. The straight beak also distinguishes the fossil from the genus Alca. Other distinctions from Alca include the more rounded shaft of the humerus and the less acute bend in the anterior profile of its distal end, and a narrower coracosternal connection. In all of these characters, as well as in the general proportions of the skeleton, the fossil resembles the murrelets of the genus Uria.

Uria brodkorbi new species

Figures 1-4

Holotype.-- PB7960, consisting of impressions of skull and anterior portion of skeleton on two slabs of diatomite. Slab PB7960A contains the skull in lateral aspect, and seven cervical

vertebrae; slab PB7960B contains the incomplete furcula, sternum, coracoids, scapula, ribs and wing bones.

Plastotypes.--Latex molds made from the holotype PB7960A and PB7960B are stored with the holotype and at LACM.

Formation and age.--Sisquoc Formation, late Miocene, Clarendonian land mammal age.

Locality.-- Johns Manville diatomite quarry near Lompoc, California. Collector and date of collection unknown.

Etymology.-- The new species is named in honor of Dr. Pierce Brodkorb.

Diagnosis.--Premaxillary symphysis shorter than in Uria aalge or U. lomvia arra, closer to U. lomvia lomvia. Height of mandible at angular greater than in either Recent species of Uria. Sternum with broadly curved anterior margin, in contrast to straight contour dorsal to forward thrust of the carinal apex typical of Recent Uria; tip of carina more truncated and anterior carinal margin more protruded anteriorly. Coracoid with well developed procoracoid as in Recent Uria, but with the tip sharper and more upturned; scapular facet more deeply cup-shaped than in U. aalge, and rounder, less oval than in U. lomvia; glenoid facet broader than in either Recent species. Humerus with area below head narrowed by flange extending mediad from pectoral attachment below external edge of head, and, internally, by raised area marking medial extent of capital groove; line of M. latissimus dorsi anterioris not paralleling shaft as in Recent species of Uria, but slanting palmar from distal edge of pectoral scar along external side of shaft, nearly 20 mm in length. Distal

metacarpal symphysis of carpometacarpus with metacarpal III sloping distad rather than forming distinct right angle as in U. aalge; closer to U. lomvia, but distal margin more raised.

Measurements (in millimeters).--Because of the condition of the specimen, many of the measurements are based on the latex mold, with the skeletal impressions used as a check. At best all measurements are approximate.

Skull: Greatest length 93.6; length of rostrum 53.0; length of premaxillary symphysis 25; greatest height of mandible 12.5.

Sternum: Length from carinal apex to tip of posterior lateral process 122; height from carinal apex to ventral lip of coracoidal sulcus 36.

Coracoid: Length from foremost (anterior) edge of coracohumeral surface to external tip of sternal facet 42.5; depth of shaft to tip of procoracoid 11.5; breadth of glenoid facet 6.5; length of glenoid facet 8.0; distance from procoracoid to foramen 6.6.

Humerus: Greatest length 90 approx.; breadth of proximal end across external and internal tuberosities 18; proximodistal height of head 7; length of pectoral attachment through external tuberosity 12; greatest breadth of pectoral attachment 4; greatest distance from distal end (externally) to point of contact of ectepicondylar prominence with shaft 12.3; depth of external side of distal end 8.0; depth of shaft above distal end 7.5.

Ulna: Depth of distal end, externally, 8.0.

Radius: Length 66 approx.

Carpometacarpus: Greatest length, externally, 47.5; length

of process of metacarpal I, 9.3; depth of distal end from internal tuberosity of metacarpal II through distal metacarpal symphysis, measured on right carpometacarpus, 8.0.

Wing phalanges: Lengths: digit I, phalanx 1, 21.2; digit II, phalanx 1, 20.8; digit II phalanx 2, 21.5; digit III, phalanx 1, 9.3.

Description.--As exposed on the diatomite slabs and shown in the latex molds, the left side of the skull and sternum and the elements of the left side of the skeleton are best preserved.

Although the cranial part of the skull is incompletely preserved, the rounded posterior contour of the supraoccipital and the narrow, sharply ridged temporal fossa are distinguishable. The latex mold ^(Fig. 3) defines the extent of the short beak, which more closely resembles that of Uria l. lomvia than any of the adult specimens of either U. l. arra or U. aalge at hand. The mandible depth is even greater than in U. l. arra (see Table I).

The position of the furcula is indicated on holotype slab PB7960B by two holes anterior to the coracoids. Filled with latex in preparing the molds, the poorly defined tips appear, but reveal no dependable characters.

The sternum is damaged posterior to the coracoidal sulcus, and the area of the costal ridges is pushed forward and folded onto the carina so that from this point to the posterior end the dorsal surface is exposed. Because of this damage, the total length as measured on the specimen (and given above) could be as much as 10 mm less than the actual length of the sternum.

The anterior contour of the carina shows clearly in lateral view (Fig. 2)

as a broad arch, in contrast to the straight contour dorsal to the forward thrust of the apex typical of the Recent species of Uria. Further distinctions lie in the more truncated tip and the more forward-protruding flange along the anterior carinal margin. Only one Recent specimen of murre (U. aalge californica, LACM 674) has a suggestion of these characters.

The brachial tuberosity is poorly shown on the right coracoid, and is not visible on the left, which is otherwise better preserved. The glenoid facet is relatively broader than in the modern species of Uria. The scapular facet is deeper than in U. aalge, being closer to U. lomvia in this respect, though more rounded, rather than oval. The length of the procoracoid resembles the condition in Recent Uria, but the projection is sharper and more upturned than in most of the specimens examined (see Fig. 2). The small foramen is well below the tip of the procoracoid; the size and position of the foramen is variable in the sample of specimens of the Recent species. Although the sternal facet of the coracoid is not exposed, the shape of the coracoidal sulcus of the sternum suggests that the sternal end of the coracoid is long and narrow as in Uria, with the facet possibly even more laterally extensive than in the Recent species. This condition is in contrast to that found in the puffins, or even in Alca, in which this articular surface is shorter and deeper.

The left scapula is incompletely revealed in ventral view (Fig. 2). Neither the acromion nor the coracoidal articulation is visible, and the shape of the glenoid facet is not clear.

The broken left humerus (Fig. 4) lies with the proximal end presenting an aspect slightly lateral of anconal, while the distal fragment is turned so as to expose more of the external side. The proximal end of this element shows the most notable differences from the Recent species of Uria. As observed in the latex mold (Fig. 4), the pectoral attachment is broad, with a distinct flange extending below the head, narrowing the area between the attachment and the median crest; the head appears to be less sharply undercut. A flange of variable extent occurs in a few specimens of both U. aalge and U. lomvia, but in none is it as strongly developed or as evenly contoured as in the fossil. The line of the anterior latissimus dorsi muscle in U. brodkorbi is as long as in Recent Uria, but the slope is more markedly palmar and is emphasized by the more rounded anconal aspect of the shaft. Distally, the external tricipital groove is sharply rimmed; the entepicondyle is incomplete and the width of the internal groove is not clear. However, the slight anconal flare toward the distal end, as shown in the latex mold (see Fig. 3) suggests that the internal groove is broader than the external, thus resembling the condition in Uria. This contrasts with Alca in which the anconal contour of the shaft bends palmar, and the two grooves are of equal size. The tip of the ectepicondylar process is more prominent than in most specimens of Recent Uria. There is, however, considerable variation in the Recent series, and a few specimens approach the same prominence, although only one (of maximum size) is as elevated above the distal end, and the ectepicondylar process is less vertically placed with respect to the shaft.

The ulna and radius are crushed proximally, and provide little information other than approximate length of the radius.

The external side of the complete left carpometacarpus, and the internal side of the distal end of the right carpometacarpus are exposed. In overall length, as well as in the length of the process of metacarpal I, the element falls within the size range of U. l. arra (see Table 1). The rounded distal contour of metacarpal III (see Fig. 2) is approached in some specimens of U. lomvia.

Comparison with previously recorded fossil Alcidae.---Three extinct species of Uria have been previously described, each on the basis of the humerus: Uria antiqua (Marsh 1870) from the Lower Pliocene of North Carolina; U. affinis (Marsh 1872) from the Pleistocene of Maine; and U. ausonia Portis 1887 from the Pliocene of Italy. U. ausonia is based only on the distal end of a humerus, which I have not examined.

A cast of the holotype of each of the other two species is available. Both are longer than the humerus in the holotype of Uria brodkorbi (U. antiqua length 96.2 mm, U. affinis length 95.0 mm as given by Marsh (1870 and 1872), and closely approximated on the casts), with greater breadth between the pectoral attachment and the median crest. Both also have the line of M. latissimus dorsi anterioris paralleling the shaft as in Recent species of Uria, in contrast to U. brodkorbi in which the muscle line slopes palmar. U. affinis further resembles Uria, distally, in the unequal breadth of the tricipital grooves, the internal being wider, as appears also to be true of U. brodkorbi. In U. antiqua

the grooves are of equal breadth. The humerus of U. antiqua resembles that of U. brodkorbi in the rounding of the shaft toward the proximal end, although the shaft is heavier and the apex more anconal in position in U. antiqua.

There is one previous tentative record (Howard 1978) of Uria from the Miocene of California. The record is based on an incomplete proximal end of a humerus (LACM 52018) from locality LACM 6902 in the late Miocene Monterey Formation of Orange County. The specimen is slightly smaller than the humerus of the approximately contemporaneous U. brodkorbi, lacks the flange from the pectoral attachment to the head, and is more excavated below the head. It resembles the humerus of U. brodkorbi, however, in the rounding of the shaft and the palmar trend of the line of M. latissimus dorsi anterioris.

Two extinct genera are worthy of consideration in comparison with U. brodkorbi: Australca Brodkorb 1955, genotype A. grandis from the Middle Pliocene Bone Valley Formation of Florida; and Miocepphus Wetmore 1940, genotype M. mcclungi from the Middle Miocene Calvert Formation of Maryland. The holotype of A. grandis is a coracoid, with humerus, radius, ulna, carpometacarpus and tibiotarsus referred (Brodkorb 1955). The holotype of M. mcclungi is a humerus. This and a subsequently referred humerus (Wetmore 1943) from the type locality are the only recorded specimens of Miocepphus.

Through the kindness of Dr. Storrs L. Olson, of the National Museum of Natural History, specimens that he considers referable to Australca and Miocepphus have been made available (see Comparative Material above). The Australca material is similar

in size to measurements given for A. grandis (Brodkorb 1955), but is not from the type locality. The Miocepheus humerus, however, comes from the same formation as the holotype of M. mcclungi, though in Zone 13 of the Calvert Formation (the type is from Zone 12). The specimen is intermediate in size between the holotype (Wetmore 1940) and the referred specimen (Wetmore 1943) of M. mcclungi, both of which are markedly smaller than the humerus of U. brodkorbi. ↑

No 4 As size is not a generic character, the specimens of both Australca and Miocepheus are analyzed on the basis of their qualitative characters.

The major distinction of the Australca coracoid from that of U. brodkorbi lies in the more posterior position of the procoracoid (inset from the median edge of the coracoidal shaft). This character is shown clearly in both the referred specimen at hand and in the illustration of the holotype (Brodkorb 1955: 50, fig. 24). With respect to this character comparison with U. brodkorbi is best observed on the right coracoid of the holotype in which the close proximity of the lower end of the procoracoid to the median edge of the shaft is discernible on the latex mold. In the humerus of Australca, the area below the head is broader and the pectoral scar longer and relatively flatter than in U. brodkorbi; distally the apex of the ectepicondylar process is more prominent and forms a more acute angle with the shaft. Although the Australca carpometacarpus resembles that of U. brodkorbi in the long process of metacarpal I, the angle between the process and the external trochlear crest is less acute. U. brodkorbi resembles the Recent species of Uria in this character.

The humerus of Miocepheus is similar to that of U. brodkorbi in having a flange from the pectoral attachment narrowing the area below the head. The attachment itself, however, is flatter and less ovoid, and the external tuberosity is less prominent anconally. The line of the M. latissimus dorsi anterioris slopes slightly palmar, as in U. brodkorbi, but it is shorter. Distally, the tricipital grooves are equal in size as in Alca, as distinguished from the condition in Uria. The ectepicondylar process is even more prominent than in Australca, and terminates in a distinct papilla.

Summary and Conclusions

The holotype skeletal impression of Uria brodkorbi, transformed by latex molds into bones in relief, provides a rare opportunity of to study the morphology of the associated elements of one individual fossil bird.

Viewed as a whole, the skeleton resembles that of the murre, genus Uria. In relation to Recent species of the genus it appears to have been of sturdier build, with a stronger sternum and a short beak. Although in length the coracoid and humerus are within the size range of U. aalge californica (see Table 1), the breadth of these elements equals or surpasses those of the larger U. lomvia arra. The carpometacarpus is similar to some specimens of U. lomvia in the rounding of the distal end of metacarpal III, and closely resembles U. l. arra in size.

Some of the individual elements, if found isolated, might well suggest generic distinction from Recent Uria. This is particularly true of the sternum and humerus. However, the

large series of modern skeletons studied reveals trends toward one or more of the apparently distinctive characters. Although no single Recent skeleton of Uria has a combination of characters matching those of the fossil, there is sufficient similarity within the comparative series to indicate that U. brodkorb is entirely consistent with what would be expected in a Miocene ancestor within the genus..

Therefore, the evidence weighs in favor of the new species being retained in the genus Uria, rather than in the erection of a new genus.

Acknowledgments

I am especially indebted to Pierce Brodkorb for the opportunity to study this important specimen from the Sisquoc Formation, and for providing the photograph taken by Robert D. Weigel (Fig. 2). I am also deeply grateful to my husband, Henry Anson Wylde, for preparing the latex molds of the specimen and for photographing figures 1, 3 and 4. Richard Maier (LACM) *Maier* assisted by making the excellent print of the photograph for fig. 1.

My thanks are also extended to Storrs L. Olson, Stuart L. Warter, Jean Geary and Diana Matthiesen for providing comparative material. My continuing appreciation is extended to members of the two science divisions of the Natural History Museum of Los Angeles County for their cooperation.

The following persons critically reviewed the manuscript, providing helpful suggestions: Lawrence G. Barnes, Pierce Brodkorb, Kenneth E. Campbell, and Storrs L. Olson.

reg.
~~Accepted for publication February 19, 1981~~

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Use

(right) and PB7960B (left). Lighting of photograph

Lighting of photograph
length from tip of beak to posterior tip of sternum
relief. Approximately $\times \frac{1}{2}$ 335 mm

the angle viewed, the skeletal elements appear raised

Length of complete
anther tube 47.5
mm

x-2/3. Length from tip of beak to posterior tip of culmen = 38 mm

Approximately xl.

□ □ □ □ □ □ □ □ □ □ □ □

Length from tip of beak to ^{posterior tip} ~~tip of lateral process~~ of sternum 33.8 mm
 33.8 cm

aabedefghi jklmnopqrstuvwxyz

22

abcdefghijklmnopqrstuvwxyz

abcdefghijklmnopqrstuvwxyz

53

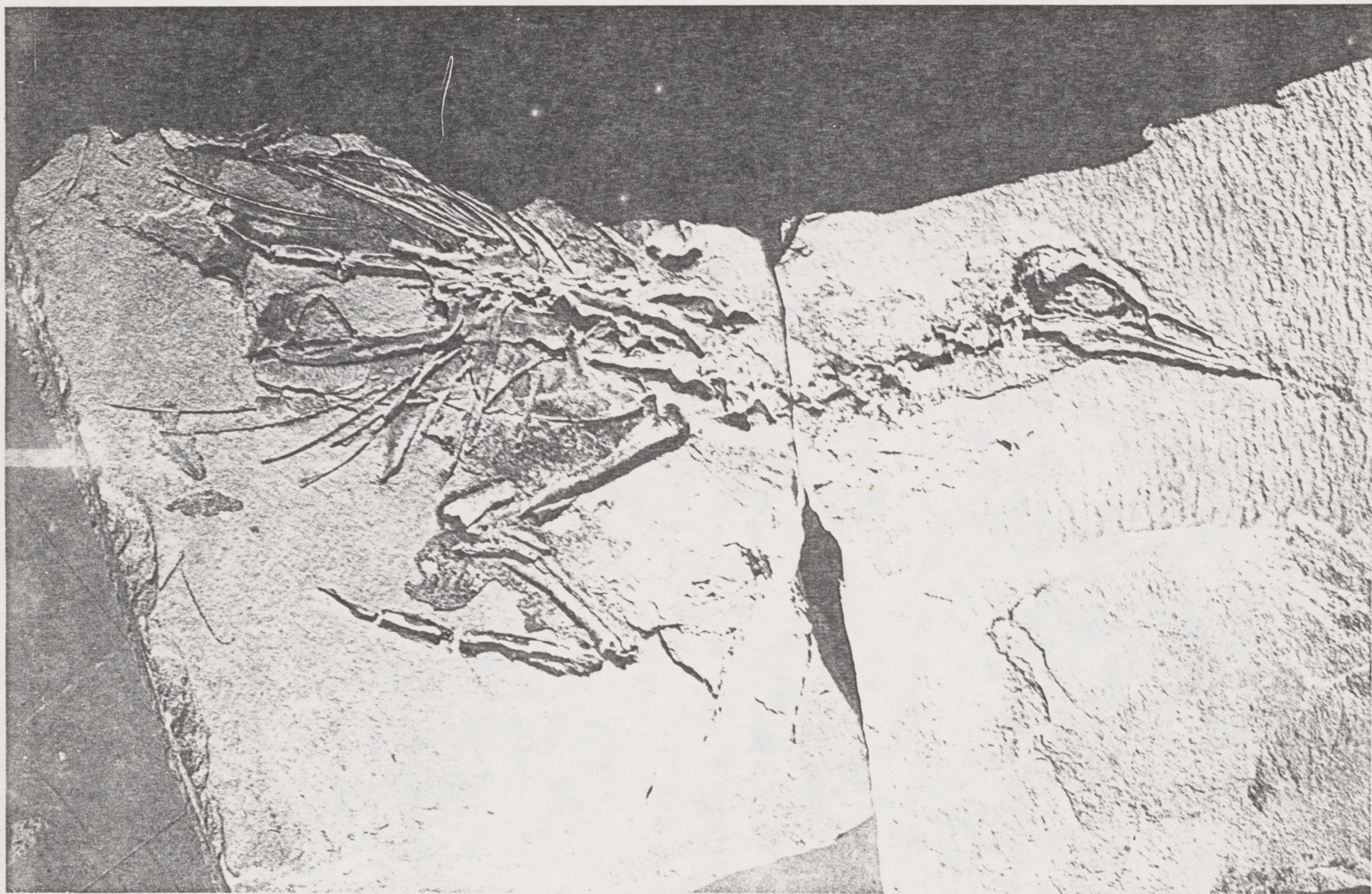
Table 1
Measurements (in mm) of holotype of Uria brodkorbi
and comparable elements of U. lomvia and U. aalge*

p. 18

Element	<u>U. brodkorbi</u>	<u>U. l. lomvia</u> (2)		<u>U. l. arra</u> (10)			<u>U. a. inornata</u> (6)			<u>U. a. californica</u> (17)		
		Max.	Min.	Max.	Mean	Min.	Max.	Mean	Min.	Max.	Mean	Min.
Skull												
Greatest length	93.6	95.0		108.9	104.7	101.0	107.2	102.2	97.2	110.2	104.6	100.3
Premaxillary symphysis**	25.0	21.7		27.7	25.0	23.3	30.1	28.0	26.2	31.7	28.6	25.5
Greatest height mandible	12.5	11.0		11.8	11.2	10.7	10.4	9.3	8.6	11.0	10.0	9.1
Coracoid												
External length**	42.5	41.8	41.4	47.9	45.9	44.6	42.0	41.7	41.1	43.2	40.4	39.4
Depth to procoracoid**	11.5	11.0	9.7	12.0	11.2	10.5	11.3	10.5	10.0	11.2	10.4	10.0
Breadth glenoid facet	6.5	5.6	3.5	6.4	5.6	5.2	5.7	5.3	4.8	5.6	5.1	4.7
Humerus												
Greatest length	90 ?	89.9	85.7	99.3	93.4	86.3	88.5	87.6	87.0	91.8	87.6	83.3
Proximal breadth**	18.0	17.4	16.4	18.5	17.7	17.0	17.2	16.8	16.3	17.4	16.5	16.2
Ectepicondylar prominence**	12.3	11.1	11.0	12.3	11.6	11.0	11.5	11.2	11.0	11.3	10.9	10.0
Radius												
Length	66 ?	65.3	64.0	72.2	68.9	65.8	65.2	62.7	61.8	66.4	63.6	61.0
Carpometacarpus												
External length	47.5	44.3	44.0	49.1	47.6	45.4	45.7	44.4	43.1	46.8	44.4	43.4
Length process metacarpal I	9.3	8.1	7.4	9.4	8.5	8.0	8.6	7.8	7.3	8.8	7.9	7.5

*Numbers in parentheses indicate number of specimens measured
(for U. l. lomvia, only one skull available)

**See MEASUREMENTS under SYSTEMATICS for explanation of areas measured



Howard Fig. 1 slightly more than $\frac{1}{2}$ size. (47 mm = 90 mm)



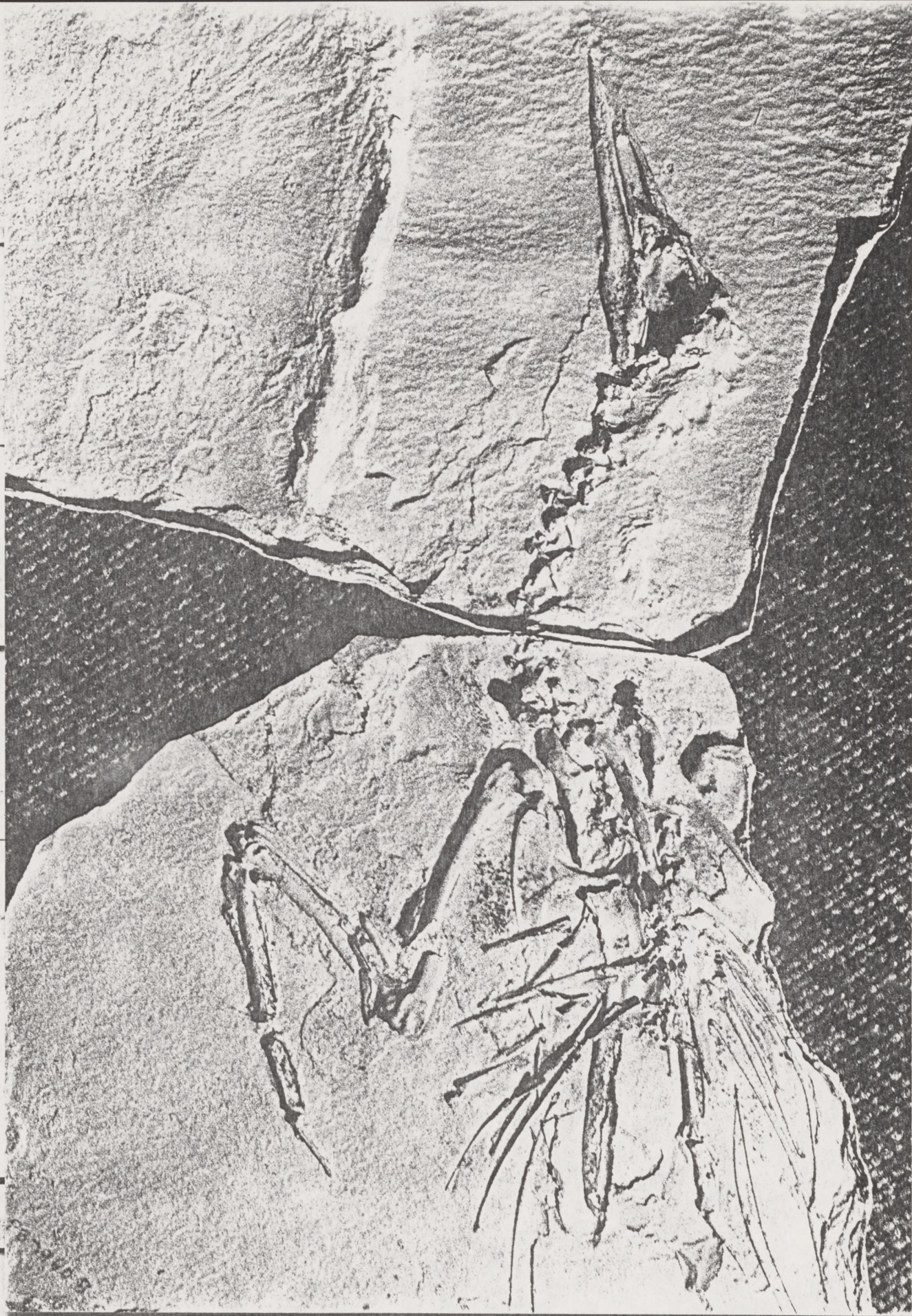
Fig. 2

Howard Fig. 2 approx. nat size

Howard

Fig. 3

X 2/3





Howard, Fig. 4
 $4\frac{5}{16} \times 2\frac{15}{16}$ over all

1870

Notice of some fossil birds, from the Cretaceous and
Tertiary formations of the United States

Amer. Jour. Sci. & Arts Vol. 49: 1-16

Cathartes antiquus pp 12-13 (no illus.)

Length of humerus as given 96.2

Transverse diam prox end 21.0

Vertical diam. articular head 14.2

Transverse diam " " 8.2

Vertical diameter distal end 13.8

Longer diameter of shaft at center 8.4

Shank " " " " 5.0

said to resemble
V. lanius
More obliquely
rounded distal end
transversely & vertically
upper " triangular depression
(distally wider, broader
in lower the bone groove
is wider.

- ✓ Check source of
- ✓ A. occidentalis specimens
- ✓ Look at P. femoralis
(Vaughan's letter)
- ✓ Show Mark Riedel's
letter to Jerry
- ✓ Mt Helms slides
- ✓ Letter from Puncher
re Morphological
Director
- ✓ Q & A News

Alcuni characters

Wash references
for antiqua
affinis

1870 Amer Jour Sci Ser 2 vol 49
no. 4 p 213

1872 Amer Jour Sci Ser. 3 vol. 4
#22 p. 259.

Measurement of Recent Murres, genus *Uria* for a fossil (would see)

Skull

		from photo nasal projection	jaw dist
<i>Uria adley calif.</i>	Length skull 100.3 (min specimen)	beak 166.0	10.1
	fossil 90.5	110.6 (max ")	46.0 11.7
<i>U. lomvia</i>	" " 95.2	may ?	fossil 49 58.0 11.7 12.5

Coracoid length as meas in fossil *Uria a.* 40.2 max, 37.6 mm fossil 41
Uria l. 38.4

Dist. pectoral to shaft

Uria a. 11.0 max, 10.2 mm fossil 12
Uria l. 11.1

Dist. pectoral to furrow

Uria a. 5.3 max, 5.2 mm

Dist. scap. facet to furrow

Uria a. 5.1 max 4.0 min fossil 6
U. l. 7.0

Humerus length to ectepicondyle at dist. end (gr. ext + length)

U. a. max 90.2, min 82.7 fossil 87-90?

U. l. 86.4 (60th) 89.9 (10689) 85.6 (10689)
U. l. arra

prox. br. int to ext. tubercle

U. a. max 12.4 max 16.1 mm fossil 18 alaska
U. l. 16.7-16.8 (17.1-17.4 10689 + 87 *U. l. arra*)

length x br. post, scap

U. a. 10.3 x 3.1 max, 10.3 x 3.2 fossil 12 x 4
U. l. 11.4 x 3.3 10.2 x 3.35

U. l. arra 9.5 x 3.1 9.1 10.68
 11.5 x 3.3 10.68
U. l. arra

Ht. ectepicond. from furrow
 ect. condyle

11.97 10.89 *U. a.*
 11.97 11.96 *U. l.*
 11.97 11.96 *U. l. arra* 10.08, 9.6 9

fossil 11.0

depth of above ect. epicondyle from furrow

U. a. 7.4 (#674), 7.2 (#480) fossil 8.5
U. l. 7.0 (#18890), 7.2 (#1885) *U. l. arra* 7.5 60th 87 + 9

Radius length

U. a. 66.3 (#674), 60.4 (#480) fossil 66?

U. l. 64.9 (1885), 67.8 (18890)

Alula dist br. ext. *U. a.* 7.1 (674), 7.5 (480) fossil 7.5

U. l. 7.0 (1885), 7.3 (18890)

Carpometacarpus

ext. length

U. a. 46.8 max, 43.8 min

U. l. 44.0 (18890), 43.9 (1885)

fossil 47.5

Length Process M1

U. a. 7.2 (674), 8.0 (480) fossil 10 mm

U. l. 7.4 (18890), 8.07 (4885)

Process M2 + M3

U. a. 6.3 (674), 6.2 (480) fossil 8 mm

U. l. 5.8 (18890), 6.1 (1885)

± 674 max
 ± 480 min

carpus in line
 M1 process
 long but humerus points

Stemum

Length from carina apex to posterior labial process

U.a. 130.4 (674) ^{91.5 (135.5)}, 110.3 (480) 91.6 (123.8) ~~100.5~~ ^{90.5}

U.l. 110.5 (18890) ^{91.3}, 109.4 (1885) 91.6 (120.8) ^{120?}

Ht ventral lip carinoid sulcus to carinal apex

U.a. 36.0 (674) 32.8 (480), 32.4 (4697) ^{fossil 34.5}

U.l. 33.0 (1885), 34.2 (18890)

Dist carinal apex

U.a. 6.0 (674) 6.0 (480) (broken?) 4.9 (4697) ^{fossil 8.5}

U.l. 5.1 (18890) 4.8 (1885)

Wing phalanges

Remitted to
Linné 1890
D2 P2 shute
D1 P1 Jones
same volume 1885

D1 P1 U.a. 23.4 (674), 22.7 (480), 22.5 (697) ^{fossil 22.0}

U.l. 23.3 (1885) 22.9 (18890)

D2 P1 U.a. 21.0 (22.1 (674)) / 19.2 (20.9 (480)) / 19.4 (21.0) 697 ^{fossil 22.0 (20.6) 100 20}

U.l. 19.4 (21.5 (1885)) / 19.5 (21.1 (18890)) 19.5 (21.1 (18890)) ^{104 20}

D2 P2 U.a. 21.4 (674) 20.3 (480), 18.7 (4697) ^{fossil 21 mm}

U.l. 18.8 (1885) 18.2 (18890) ²³³

D3 P1 U.a. 10.1 (674) (2.4 (480)), 9.8 (4697) ^{fossil 9 mm}

U.l. 10.2 (1885) 10.4 (18890)

Tarsula

Pr U.a. 36.2 (480) (37.5 (4631)) 36.4 (4674), 36.8 (4697) ^{fossil 39?}

U.l. 35.1 (1885)

Primary from tip to ext. naris

U.a. 26.7 (480), 30.2 (674)

U.l. 21.8 (18890)

Ht primary to dentary & ant. naris

U.a. 10.3 (480), 11.4 (674)

U.l. 11.0 (18890) not available in 1885

Depth lower jaw at same level

U.a. 4.75 (674), 4.65 (480)

U.l. 4.5 (18890) 3.6? (1885) ^{89?}

Ht. angular - subangular area jaw U.a. 10.6 (674) 9.5 (480) ^{fossil 12.5}

U.l. 12.0 (18890) 10.6 (1885)

Caranx melampygus

	l. operculum	area 10	l. operculum	l. operculum 2
Length	49.1	46.1	44.2	44.0
M1	9.4	8.0	8.1	7.4
d. operculum	8.0	7.5	7.2	6.9

	U. a. caud 94mm	U. a. caud 94mm	U. a. caud 94mm	U. a. caud 94mm
Length	46.8	42.4	45.7	43.1
M1	8.7	7.8	8.6	7.3
d. operculum	8.0	7.1	8.0	7.6

	l. operculum	Skull	l. operculum
Length	108.9	101.7 (100?)	95.0
beak	60.7	55.7	51.8
premax	27.7	23.3	21.7
l. operculum	11.8	10.7	11.0 9.2

	caudal caud.	caudal caud.	caudal caud.	caudal caud.
Length	110.2	100.3	107.2	97.2
beak	61.3	55.9	58.8	51.8
premax	31.7	25.5	30.1	26.2
Jaw	11.2	9.5	10.4	8.6

	10mwa	10mwa	10mwa
1 Humus	99.3	90.5	89.9-85.7
2 Or.	18.5	17.0	17.4 16.4
3 sctch	12.3	11.3	11.1 9.2
4 depth extent	8.4	7.8	7.7 9.5
5 " sh	8.3	7.3	7.4 7.1
6 peat	3.8	2.8	3.0 2.9

	U. a. caly	U. a. thomasi
1	91.8 - 83.3	88.4 87.0
2	17.4 16.2	17.2 - 16.3
3	11.3 - 10.0	11.5 - 11.0
4	7.9 - 7.2	8.0 - 7.5
5	4.5 - 7.0	7.9 - 7.2
6	3.9 - 3.1	3.8 - 3.0

	Amelika
1	93.9 - 86.3
2	19.2 - 16.9
3	
4	
5	
6	

core
 length ① 47.9 44.6
 glauoid ② 6.4 5.2
 in, wt ③ 9.5 7.6
 depth ④ 12.0 10.5
 to foramin ⑤ 7.0 5.0

laminae lamina 2
 41.5 41.7
 5.6 3.5
 8.3 8.0
 11.0 9.7
 6.2 4.4

1 ^{incisive}_{dent} alge caly (17) 43.2 39.4
 2 5.6 4.8
 3 8.4 7.3
 4 10.2 10.0
 5 6.6 4.5

alge in mouth ⑤
 42.0 41.1
 5.7 4.8
 8.6 7.9
 11.3 10.0
 6.0 5.4

Concavities

24.8
 25.9 24.5 23.5 23.7 23.0
 90382 24.1 24.6 24.2 23.5

Brookhart's specimen of V. n. o.

865

58

97

Humerus - pectora attachment broad 3.9 mm 36% $1/96$
 relative broader & shorter than in
 modern U. aalge

Shaft appears to be ~~shorter~~ & in this respect
 the proximal from 6902 resembles it (# 52018)
 52018 also has broad flat, attach.

2790. U. aalge
 2.9-10.7 in 480
 30-11.2 in 697
 35-10.0 from 6902
 3590
 3.3 x 10.1 lonvia
 32.6 90

Anterior end of sternum (beak) appears to be more blunt & has flange
 anterior to main anterior contour not present in U. aalge or U. lonvia
 Line from process to shaft longer as in U. aalge (U. lonvia short) but further
 farther removed from scapular facet

3.7 in San Mateo 5.7 from process to process edge (4.1 in U. aalge 697 - 3.6 in 480
 2.8 in San Mateo 4.4 or 4.5 from process to edge of scap. facet 3.5 " " 697 - 2.7 in 480
 (process very small
 in San Mateo)

Length of sternum 90.4 mm 100.3
 " lonvia 85

Distance from posterior end of
 lower jaw to point
 of greatest depth of jaw
 on lower side 22.2 21.6

Posterior point to anterior
 edge of post. articular process 10.4 10.6

Depth of jaw at highest
 pt on upper contour 8.75 8.75

Depth of jaw at level
 where nasal connects
 with maxillary 6.6 6.05

Ht beak at ant. edge nose 6.7 6.4
 Depth upper & lower mandible at J 11.9 10.3

Gr. h. Mandible only 4.8 4.0

Birds.--Avian specimens have been reported in the Modelo Formation at four localities on the San Fernando Valley side of the Santa Monica Mountains and at one site in El Sereno closer closer to Los Angeles. A single humerus was found in El Sereno, and was assigned to Palaeosula stocktoni (Miller 1935:75), the type of which is from the Valmonte Diatomite of the Monterey Formation near Lomita. Originally described as Sula stocktoni Miller

Meas.

Uma aulige californica

Venture

V. aulige

485

477

494

507

697

6747

4180

g. length skull	106.6	106.3	107.7	102.6	103.2	110.2	100.3	92.8
g. depth lower jaw	11.0	10.2	10.0	—	9.7	10.5	9.5	12.5
length premax ant. to nose	31.7	31.1	29.7	26.8	25.5	30.4	26.8	23.0
length snout from dorsal tip of coracoid surface to tip of snout	40.3	39.4	41.0	39.5	42.0	41.6	40.5	42.1
depth skull to tip of premax	10.2	10.4	10.6	10.4	10.4	10.7	10.3	11.5
g. glenoid facet	5.0	5.3	5.3	4.8	5.2	4.8	4.7	6.5
length glenoid facet	7.3	7.4	7.5	6.6	7.4	7.8	7.8	8.0
Scap. facet to foramen	6.7	6.0	6.2	6.2	5.9	4.6	4.4	6.0
Chond. edge of each coracoid surface	5.3	5.4	5.3	5.3	5.5	4.5	4.8	6.6
foramen	8.7	8.3	9.2	8.9	8.2	9.8	8.3	8.9
br. prox. acrom. ext. r. int. + tabernis	16.5	16.6	17.4	16.4	16.5	17.0	16.2	18.0
prox-dist depth head	6.2	6.1	6.3	5.9	6.2	6.0	6.4	7.0
length pectoral attach	12.0	11.0	11.1	10.5	11.2	10.6	10.7	12.0
through ext. tub.	3.6	3.3	3.9	3.6	3.3	3.2	3.1	4.0
g. br. pect. attach	10.9	11.0	11.2	10.8	11.3	11.2	10.9	12.8
contact ectepicard. form.	9.5	9.2	9.3	9.3	9.3	9.0	8.5	10.7
depth ext. dist. dist.	7.8	7.9	7.9	7.2	7.8	7.8	7.7	8.0
depth shaft (dist.)	7.0	7.5	7.5	7.2	7.2	7.3	7.1	7.5
g. length radius	61.9	62.0	66.5	64.7	63.0	66.3	61.0	66.0
ext. dist. depth when	7.4	7.2	7.9	7.5	7.6	7.4	7.3	8.0
length carpal (ext.)	43.4	—	45.7	44.6	43.4	46.8	43.8	47.5
length process M1	8.5	7.8	8.3	7.9	7.8	7.5	8.1	9.5
depth dist. end	7.7	—	7.6	7.3	7.6	8.0	7.6	7.5
length sternum	120.6	126?	126.3	114.0	117.8	128.5	111.6	122
depth from carpal apex to ventral lip sulcus	32.6	34.0	27.9	34.8	33.1	36.2	32.8	36
br. carpal aperture	6.2	5.6	6.8	6.3	4.9	5.9	—	9.5
br. head ant. to nose	10.9	10.9	10.7	—	—	—	—	11.7

ectepicardial foramen
in these 3 U. aulige specimens (477 more prominent)
V. aulige from more of a right angle but doesn't project as much as fossil
(transverse in both)

U. aalga Bent
89011 ♀

U. aalga Calif
Santa Cruz Is.
89013 dead on beach

specimen

Humus		90.1	stom
length	88.4	16.4	slightly
ls. fin	16.9	3.2	more curved
ls. fin	3.1	11.0	ant. center
caudal peduncle	10.0	7.5	
depth ant. dist	7.7		
Caudal length	44.7	44.7	47.9
NI	8.7	7.8	
ext dist depth	7.1	7.3	
Caudal length	42.4	42.6	48.2
the caudal fin		5.0	
ls. fin	4.8	7.6	
depth	8.4	10.2	
depth			
radius length	63.4	43.8	
ulna ls.	7.3	7.7	
stomach length	102.5	107.3	93.6
head	80.0	58.0	59.8
premax	29.5	28.4	24.7
lower jaw depth	10	10.0	12.6
ht			36.0
stomach	35.4	34.3	

Aug 2, 1980 NOTES

Depth head
2.4 in *U. a. antiqua*
9.5 for *ls.*

Check whether point of head is medial of isolated crest
the specimen of *U. a. antiqua*.
Two *U. linnaria* area it is medial (also true of *P. pinnatus*)
whereas in *U. aalga* it is more toward internal side
and about one the median crest.
H's 494, 477, 485, 507

U. a. inornata

OVER →

St Paul Id.

Vina adage (inornata presumably)

St Paul 90413

C. a. inornata of
with shell

90432 ♀

90444 ♂
small plate

90433 ♂

90427 ♀

90434 ♀

Humerus

length

87.3

82.9

(88.4)

(87.0)

89.7

width

16.9

(17.2)

16.75

17.0

16.3

11.0

thickness

11.3

11.1

11.5

11.5

11.0

7.5

ex depth dist

9.5

7.8

7.25

8.0

7.7

7.7

dist sh

7.4

7.9

7.25

7.8

7.2

ex post.

3.15

3.8

3.6

3.0

3.0

Cervical

41.9

42.0

(42.0)

(41.15)

41.8

M 42.7

length

4.9

(5.75)

5.4

5.7

(4.8)

M 51.3

in glenoid

7.9

8.6

8.6

8.4

8.2

M 51.3

dist s

11.3

11.1

10.3

10.0

10.1

M 10.5

depth of process

5.7

5.4

5.4

5.5

6.0

tip of process

5.7

5.4

5.4

5.5

6.0

Carpus

(43.1)

44.3

44.0

(45.7)

43.8

44.7

length

7.5

7.9

7.5

8.2

(7.3)

(8.6)

M1

7.6

8.0

7.9

7.7

7.6

7.6

dist

(61.8)

62.0

62.2

—

62.5

(65.2)

rad

(61.8)

62.0

62.2

—

62.5

(65.2)

width

(61.8)

62.0

62.2

—

62.5

(65.2)

dist

(61.8)

62.0

62.2

—

62.5

(65.2)

width

(61.8)

62.0

62.2

—

62.5

(65.2)

dist

(61.8)

62.0

62.2

—

62.5

(65.2)

width

(61.8)

62.0

62.2

—

62.5

(65.2)

dist

(61.8)

62.0

62.2

—

62.5

(65.2)

width

(61.8)

62.0

62.2

—

62.5

(65.2)

dist

(61.8)

62.0

62.2

—

62.5

(65.2)

width

(61.8)

62.0

62.2

—

62.5

(65.2)

dist

(61.8)

62.0

62.2

—

62.5

(65.2)

width

(61.8)

62.0

62.2

—

62.5

(65.2)

dist

(61.8)

62.0

62.2

—

62.5

(65.2)

width

(61.8)

62.0

62.2

—

62.5

(65.2)

dist

(61.8)

62.0

62.2

—

62.5

(65.2)

width

(61.8)

62.0

62.2

—

62.5

(65.2)

dist

(61.8)

62.0

62.2

—

62.5

(65.2)

width

(61.8)

62.0

62.2

—

62.5

(65.2)

dist

(61.8)

62.0

62.2

—

62.5

(65.2)

width

(61.8)

62.0

62.2

—

62.5

(65.2)

dist

(61.8)

62.0

62.2

—

62.5

(65.2)

width

(61.8)

62.0

62.2

—

62.5

(65.2)

dist

(61.8)

62.0

62.2

—

62.5

(65.2)

width

(61.8)

62.0

62.2

—

62.5

(65.2)

dist

(61.8)

62.0

62.2

—

62.5

(65.2)

width

(61.8)

62.0

62.2

—

62.5

(65.2)

dist

(61.8)

62.0

62.2

—

62.5

(65.2)

width

(61.8)

62.0

62.2

—

62.5

(65.2)

dist

(61.8)

62.0

62.2

—

62.5

(65.2)

width

(61.8)

62.0

62.2

—

62.5

(65.2)

dist

(61.8)

62.0

62.2

—

62.5

(65.2)

width

(61.8)

62.0

62.2

—

62.5

(65.2)

dist

(61.8)

62.0

62.2

—

62.5

(65.2)

width

(61.8)

62.0

62.2

—

62.5

(65.2)

dist

(61.8)

62.0

62.2

—

62.5

(65.2)

[illegible]

Depth
beak
ant 15
naris

Lumvia 2 from east ³⁴
 10 " alacha ³⁴
 12 " 19 from crill
 42.9 45 from
 45.8 from

native to the glenoid 57.70 - 78.970
 58.6 - 72.770
 58.5 - 62.872
 65.20 - 67.407

U. californica
U. a. viridata
U. l. loma (2)

U R A Romania
U. L. Lomua
PB 18840

U. L. Lomua
LACM 18845

U. L. Lomua
LACM
10684 10685

✓	gr length	95.2	—	—	—
✓	beak from frontal alveolus	51.8	—	—	—
✓	gr depth lower jaw	11.0	9.2	—	—
✓	length premax ant max	21.7	16.5	—	—
✓	Length from dorsal tip coraco humeral surface to tip of sternum	40.5	41.4	—	—
✓	depth shaft to pectoral	11.0	9.7	—	—
✓	br. glenoid facet	5.6	5.5	—	—
✓	length glenoid facet	8.35 ^{62.423}	8.0 ^{68.220}	—	—
✓	Scapula facet to foramen (lower edge)	6.9	5.2	—	—
✓	Tip pectoral to top of foramen	6.25	4.4	✓	✓
✓	gr. length	86.5	86.7	85.7	89.9
✓	Prey for acro tubercles	16.5	16.4	16.8	17.4
✓	Depth head max-dist	6.0	6.35	5.8	6.5
✓	Length pectoral thru ext tubercle	11.6	10.0	9.3	11.0
✓	gr. br. pectoral ext tubercle	3.2	3.2	3.0	3.0
✓	gr. br. pectoral ext tubercle	11.1	11.1	11.0 ^{11.425}	11.1
✓	to pte contact with chest	9.8 ^{144.14}	9.2 ^{148.90}	9.4	9.6 ^{144.15}
✓	depth ext ant dist end	7.2	7.5	7.2	7.7
✓	depth shaft (dist)	7.1	7.1	7.4	7.3
✓	gr length radius	64.2	65.3	—	—
✓	dist. depth (ext) ulna	7.3	7.4	—	—
✓	ext. length	44.2	44.0	—	—
✓	length MI	7.34	8.1	—	—
✓	Depth dist. end	6.9	7.2	—	—
✓	Length carpal apy to lateral process	110.10	109.9	—	—
✓	depth from to ventral epiphysis	33.4	33.0	—	—
✓	at carpal apy (tib)	5.7	5.0	—	—

RT + 0 left
 total 2612.6
 aver 90.0
 aver 90.7
 Total 1172.9

Amelutka humeri assigned to U. lomina

Lefts ^{19.0} 91.4, ^{18.4} 90.9, ^{18.0} 87.0, 90.7, 93.0, 91.9, 90.3, 86.8, 90.3, 86.3, 93.6, 87.7, 93.0
 Rts 92.7, 86.4, 88.3, 88.8, 86.8, 89.2, 91.3, 88.2, 93.0, 86.5, 89.7, 92.1, 93.9, 93.0, 90.4, 87.7
 (18) 86.3-93.9
 aver 89.98

Amelutka humeri assigned to U. aalge

Left: 85.8, 87.8, 93.8, 86.2, ^{RT} 92.2, 87.5 (Average 88.83) 85.8-92.2

Amelutka carpinitercalpi

Lefts
 length 44.6, 44.6, 46.8, 48.5, 47.0, 45.3, 46.2, 47.2, 46.2, 44.2, 47.8, 48.0, 45.6, 45.0, 45.4, 46.1, 44.4, 45.4
 M.I. 8.5, 8.0, 8.7, 9.0, 8.8, 8.0, 9.0, 8.3, 8.0, 8.5, 7.8, 9.5, 8.9, 8.7, 7.2, 8.5, 8.6, 8.5
 aver 46.0
 82.9.4 total
 aver 8.4
 152.2 total

RTs
 length 46.1, 44.8, 46.4, 45.2, 46.5, 45.3, 46.1, 47.9, 45.1, 46.3, 45.3, 42.8, 45.4, 45.0, 47.0 = 684 Total, 45.6 aver
 M.I. 8.0, 8.3, 8.3, 7.7, 8.8, 8.0, 8.2, 8.6, 8.9, 9.0, 8.5, 7.5, 7.7, 8.4, 8.4 = 124.3 total 8.28 aver

	8 <i>lomina</i> <i>Amelutka caracoid</i>				3 <i>cb</i> <i>labeled lomina</i>				3 <i>labeled U. aalge</i>				3 <i>cb</i> <i>labeled U. aalge</i>				Simple
length	47.6	45.6	46.8	44.8	44.5	43.6	44.4	44.2	39.3	41.8	44.0	42.9	43.9	42.5	48.7		42.1
depth	23.5% 11.2	23.0% 10.6	25.1% 11.8	25.2% 10.3	—	23.6% 10.3	24.0% 10.7	23.9% 10.6	11.4	11.2	9.8	—	—	10.0	9.7		11.5
length	6.8	5.8	5.5	5.7	5.8	5.4	5.3	5.2	5.3	5.3	5.5	—	—	5.6	5.6		6.5
ht/gram	6.2	6.9	6.4	5.8	—	6.8	—	6.7	6.2	5.7	6.3	5.1	5.7	5.1	4.7		6.6
ht/skull	9.3	9.1	8.8	8.5	9.2	9.3	8.5	—	4.4	4.3	4.1	—	—	—	—		8.0
glt/ht skull	66.3	65.7	62.5	67	61.0	59.1	62.3	—	41.4	43.9	41.6	—	—	—	—		51.2
glt/ht	45.8	47.8	46.0	44.8	44.3	44.4	44.5	43.6	43.2	46.2	44.8	43.1	43.9	—	—		43.0
unidentified	46.2	46.9	46.2	46.5	45.5	44.9	43.3	43.2	43.0	45.6	—	—	—	—	—		—

24.0

Humeri CSULB ⁸4592, 85.50⁸ / ⁹4636, 88.8 / ⁹4992, 85.1⁸ 5295, 85.6⁸ ^{let} ^{then}
 length 529⁸, 89.9 5248, 88.507 5252, 86.0 5398, 88.307
 CSULB 85.1 - 89.9 Total 498.81 aver 87.3
 HCM 89.3 - 91.8 Total 613.7 aver 87.6
 131.25 aver 87.5

Humeri Uta lornii

18890 length 86.3, 1885 86.1

Anolis humeri pre breadth across ut, & ext. tubercles. $M=17$
 17.5, 16.9, 18.2, 17.9, 17.9, 17.2, 17.2, 17.8, 17.7, 17.2, 19.0, 18.3, 17.4, 18.1, 17.4, 17.5, 17.9, 17.8, 17.0, 18.0, 17.4, 17.7, 17.0
 19.0 90.7 90.4 90.6 91.3 91.6 91.1 91.7 92.9 93.7 16.6

CSULB crania

3248 5245 4992 5398 4636 4592 5252 5247 PR 960

length 41.0 40.5 41.0 43.2 41.5 41.6 43.0 41.7 42.1

depth 10.8 10.4 10.3 11.2 10.0 10.8 10.5 10.2 11.5

glenoid br. 5.5 5.2 5.1 5.6 5.1 5.3 5.2 5.6 6.5

tip of process 5.5 5.7 6.1 5.7 6.3 5.6 6.4 6.0 6.6

width 8.3 8.0 8.7 8.1 8.6 8.8 8.3 8.2 8.0
 notch 6.6 6.5 6.6 6.1 6.1 6.2 6.4 6.2 6.2

Anolis humeri ht calcionaxylar process

11.1, 10.8, 10.1, 11.5, 11.2, 11.4, 11.5, 11.6, 11.8, 11.0, 12.0

11.7, 11.2, 11.3, 11.7, 11.5, 12.0

11.8 12.0 - 10.1

Unia only, Lortsent

processes top humeri 5252

humeri Hange 4992 T short head

4636 long head

Humeri		Ulna		Lumbar		Table I
length	max	min	max	min		
	91.8	83.3	93.9	85.7	(36.4) alert	90 100 ?
br arms			19.2	16.4	(16.4) alert	18.0
sub s,	17.0	16.2				
Coracoids	43.2	39.5	44.6	41.4	(41.4) alert	42.1
depth	11.2	10.2	11.8	9.7	(10.2) alert	11.5
br glenoid	5.6	4.7	5.8	5.4		6.5 larger than either Rec. form.
facet						

carpo	46.8	43.2	48.4	44.0	(44.2) alert	47.5
meta						
length			9.5	7.2	(7.2) alert	9.0
M 1	8.8	7.2				
Long Beach						
specimens						
checked						
to max						
to min						

Table I
Comparing measurements (in mm) of *U. bradshawi*, *U. lomvia* and *U. aalge*

the last one
but clear cut
edges are
difficult to identify
in lateral view
but this
is possible that
this condition is
due to the structure
fact that this is
a mold of the body
may have
presented

TABLE I

	U. brodkorbi xxxxxxxxxx	U. brodkorbi max.	U. lomivia arra (10) * min.	U. lomivia lomiv (2) max. min.	U. lomivia lomiv (2) max. min.	U. lomivia lomiv (2) max. min.	U. lomivia lomiv (2) max. min.	U. lomivia lomiv (2) max. min.
skull length	93.6	108.9	101.7	95.0 (1)	107.2	97.2	110.2	100.3
premax "	25.0	27.7	23.3	21.7 (1)	30.1	26.2	31.7	25.5
mandible	12.5	11.8	10.7	11.0 (1)	10.4	8.6	11.0	9.1
Coracoid len	42.5	47.9	44.6	41.3	41.1	41.1	42.0	39.4
breadth	11.5	12.0	10.5	11.0	9.7	11.3	10.0	11.2
br.glenoid	6.5	6.4	5.2	5.6	3.5	5.7	4.8	5.6
Hum length	90.7	99.3	90.5	89.9	85.7	88.4	87.0	91.8
prox.br.	18.0	18.5	17.0	17.4	16.4	17.2	16.3	17.4
Ht. ectepi	12.3	12.3	11.0	11.1	9.2	11.5	11.0	11.3
Carpometa len	47.5	49.1	46.1	44.3	44.0	45.7	43.1	46.8
MI	9.3	9.4	8.0	8.1	7.4	8.6	7.3	8.8
Radius	66.5	72.2	65.8	65.3	64.0	65.2	61.8	66.4

at least
a new

* The Aleut midden material fell within these ~~max~~ ^{max} ~~min~~ ^{min} ~~range~~ ^{range} for U. lomivia. The min. for length of humerus, however, was 86.8. The mins were lower, possibly indicating relationship to U. aalge.

The Aleut midden material is not included in the table as it was not definitely assigned specifically. ~~Length for maximum measurement for the three elements represented fell within~~ ^{fall between} the min of U. lomivia, the mins did not and possibly

the max for U. aalge. The max for the 3 elements available span the ~~range~~ ^{complete} ~~range~~ ^{range} of obtained from ~~the same~~ ^{complete} ~~range~~ ^{range} of Aleut material. U. lomivia and U. aalge the max with the former the min slightly greater than the min of aalge.

Coracoid len	47.8	43.0
br	11.8	9.7
glenoid	5.8	5.3
Humerus	93.9	86.8
br	19.2	16.6
ectepi	12.0	10.1
Carpometacarpal	48.6	42.8
MI	9.5	7.2

Comparing Measurements (in mm) of U. brodkorbi compared with and Recent of U. lomivia

38
26
12

(B)

H

Much more far-reaching in effect than imagery is the Hindu type of meditation. It may ^{have} ~~take on~~ religious significance. It can certainly "take you out of yourself."

Many years ago, while recovering from an illness, I was deep in the study of meditation from a religious point of view. A half hour each morning was devoted to breathing exercises and visualization. A half hour at night was the time for meditation. ~~at night~~

One night, as I sat cross-legged on my bed repeating a phrase for healing, and a prayer for understanding, I felt myself lifted out of myself--literally. Here was I, down there on the bed still sat my body.

I was frightened. I have never again attempted this particular meditation. But ^{my studies did not cease} ~~I have~~ developed a great respect for the mind of man and its potential for communion with the Mind of the Universe. A poem printed in Western Poetry, 1974 described one convincing experience.

Poem would follow

	Lumpre	15 specimens Max. M. min U. auge calif.			5 other shrimp Max M. min Upale inata			Max M. min U. lornia dent			Max M. min U. lornia dent (2)		
		46.3 LB 48											
Skull length	93.6?	110.2	100.3	107.2	97.2	108.9		101.7		95.0			
beak "	^{50.2} 53.2?	52.7	61.3	55.9	58.8	60.7		55.7		51.8			
pre "	^{25.0} 24.7	31.7	^{81.2} 25.5	30.1	26.2	27.7		23.3		21.7			
mand. ht	12.5	11.0	^{LB} 9.1 9.5	10.4	8.6	11.8		10.7		11.0 - 9.2			
Coracoid length to coracohumeral suture	42.5	42.0	39.4	42.0	41.1	47.6	^{44.4-41.4} dent	44.6	^{34.0}	41.8		41.4	
Breadth glenoid	6.5	5.6	4.8	5.7	4.8	6.4		5.2		5.0		3.5	
Ht glenoid	8.0	8.4	^{LB} 7.3	8.6	7.9	9.5		7.6		8.3		8.0	
depth to plicura.	11.5 ^{27.0}	11.2	^{onuff} 10.0	11.3	10.0	12.0		10.5		11.0		9.7	
plicura. to foram	6.6	5.6	^{LB} 4.5	6.0	5.4	7.0	^{dent}	5.0		6.2		4.4	
Humerus length	90?	91.8	83.3	88.4	87.0	99.3	^{23.9 20 26.3} dent	90.5		89.9		85.7	
prox breadth	18.0	17.4	16.2	17.2	16.3	(19.0) 8.5	17.7	17.0 (16.6)		17.4		16.4	
steeplecardy	12.3	11.3	10.0	11.5	11.0	12.3	11.7	11.3		11.1		9.2	
depth dist (ext.)	8.0	7.9	7.2	8.0	7.5	8.4		7.8		7.7		7.5	
depth shaft	7.5	7.5	7.0	7.9	7.2	8.3		7.3		7.4		7.1	
Br. feet, scar	4.0	3.9	^{102.9} 3.1	3.8	3.0	3.8	3.3	2.8		3.0		2.9	
Carapace length	47.5	46.8	² 43.4	45.7	43.1	49.1	^{dent} 48.6-42.8	46.1		44.3		44.0	
M 1	^{23.0} 9.3	8.7	^{LB} 8.8 7.5	8.6	7.3	9.4	9.5 7.2	8.0		8.1		7.4	
Br. dist	8.0	8.0	^{LB} 7.0 7.1	8.0	7.6	8.0		7.5		7.2		6.9	
Radius length	66.5?	66.4	61.0	65.2	61.8	72.2		65.8		65.3		64.0	
Ht keel sternal	36.0	37.9	32.6	36.4	33.3	40.0		35.2		33.4		33.0	

	London	max V. aalle min	max D. Lamin	U Laminia Puffed
Skull length	92.8	107.1 - 100.3	95.0	
Beak length	52.7	36.3 - 55.9 (OK)	51.8	
Prenax length	23.0	31.7 - 26.8	21.7 16.5	
		11.2 - 9.5	11.0 9.2	
Depth long jaw	12.5			
dit memo at name	→ 6.0			
Cover length	41.6	CSULB 41.1 - 39.0 40.6M 41.6 - 39.4	41.5 41.4	
depth sh	11.5	11.2 - 10.0 10.7 - 10.3	11.0 9.7	
glenoid facet				
length	8.0	7.8 6.6	8.3 7.4 8.0	
sh	6.0	5.5 - 5.0 5.3 4.7	5.6 5.2	(5.5%)
procora to furrow	7.0	6.6 - 5.3 5.9 4.5	6.2 4.4	
Humeral length	88.9 - 90.7	CSULB 88.1 - 89.9 91.8 (amplitude clearly 83.3 82.2 - 85.8)	89.9 - 85.7	
procr.	18.0	17.4 16.2	17.4 - 16.4	
g. ht ectepal				
horn	12.3	11.3 - 10.8	11.1 - 9.2	
depth distend	8.0	7.9 - 7.2	7.7 - 7.5	
depth shape	7.5	7.5 - 7.1	7.4 - 7.1	
length radius	46	66.5 - 61.0	65.3 64.0	
depth distulness	8.0	7.9 7.3	7.4 7.3	
length carpo.	49.5	CSULB 46.4 - 42.4 46.5 43.4	44.2 44.0	
length M1	9.5	8.7 - 7.3 8.5 7.5	8.1 - 7.4	
depth distend	7.5	8.0 7.3	7.2 - 6.9	
Depth stern	36.0	37.9 32.6	33.4 - 33.0	
depth tip apex	9.5	6.8 5.6	5.7 5.0	
length D2P1	20.8	M20.2 21.8 - 19.1	20.8 - 19.5	
length D2P2	21.5	24.0 - M20.4 21.9	23.0 22.9	
length D3P1	9.3	10.3 - M9.8 9.3	10.3 - 10.1	
length D1P1	21.0	M20.1 21.1 - 18.8	18.2 - 18.1	

Check to additional materials

Measurements. -- Owing to the condition of the specimen, measurements are ~~necessarily approximate~~, for the most part based on the latex molds, with the skeletal impressions and photographs used as a check.

Skull. -- ^{86.7}Length 93.7 mm (specimen) 91.5 (latex mold)
Length of beak from front nasal bridge to tip of lower jaw
^{83.5}52.3 (specimen) 50.6 (latex mold); depth from dorsal surface of prenasal
[?]34.7 mm (specimen) 31 (latex mold)

Through angular of lower jaw

Ht of angular ~~arranged as per~~ 12.5

Coracoid. -- Length from dorsal tip of coracohumeral surface
to ~~sternal end~~ ^{40.3}sternal end 41.5 (latex), depth shaft through to tip of
process 11.9; br. glenoid facet 6.7; ~~depth~~ ^{11.4}length flexor facet 8.6
^{6.5}distance from tip of process to foramen 6.7

Distance from lower edge scapular facet to lower edge of foramen ^{5.5}6.3

Humerus. -- Length prox ^{63.0}3/4 65.5, dist ^{24.0}to articular end 25.0
possible length 85.5; breadth prox end ^{13.5}point external & internal

tubercles ^{16.4}17.8, br. head through ext. tubercle 13.3; length
prox ^{11.4}11.9; greater br. process near ^{3.5}4.1; depth head ^{5.0}7.0

Distance from olecranon to olecranon ^{11.8}12.0; depth
distal end from ext. condyle to olecranon ^{8.4}8.4; depth shaft above
olecranon ^{7.3}7.3. Prox. dist. depth head 7.0

Radius. -- Length distal ^{42.3}3/4 42.3, prox frag. ^{21.1}23.4 (total 65.7);
distal breadth ^{5.8}5.8 (incomplete - to only one)

Ulna. Depth distal end externally, ^{8.0}7.5 mm

Carpometacarpus. -- external length ^{47.5}47.5; length process ^{9.4}9.4
depth from M2 to M3, ^{7.7}7.0; distal depth ^{8.2}8.2; through ^{8.3}8.3

Wing phalanges. -- Digit 1, Ph. 1, ^{21.9}21.9; length D2 P1, ^{20.0}20.6 (9.1 length ^{22.0}22.2)

Length D2 P2, ^{20.5}21.5; D3 P1, 9.3

Stem. -- Length from tip of carinus to ^{120.7}process 120.7
Height from ventral lip of coracoid ^{36.3}36.3; carinal apex ^{8.5}8.5
Depth from dorsal lip of carinus to carinal apex ^{38.2}38.2

Yurula. -- breadth between clavicles ^{39.3}39.3

Scapula. -- prox br (?) ^{10.2}10.6 (inc. ^{10.2}10.2)

Premaxillary from tip to ext. nasal opening ^{24.3}24.3; 21.2

Ht primary to dentary at ant. edge nose 12.4

Depth lower jaw at same pt. 5.7

I edited this down for the final draft of the late Miocene manuscript. I did not mark up this original copy because the detailed information here should be published.

Perhaps it would be very pertinent to include this in your *Compass Murre* paper as a review of the current status of the *Compass* bird assemblage!

Larry Barnes

Birds.-- Six species of marine birds have been described from the Sisquoc Formation (Miller 1925). Five of these are known, at least tentatively, from other Late Miocene formations discussed in the present study. At least twenty avian specimens have been recovered from the diatomite quarries, many of which have not been previously recorded. The holotypes and many of the referred specimens are in the collections of the Museum of Paleontology at the University of California. Others are in the Natural History Museum of Los Angeles County, the California Academy of Sciences and the Pierce Brodkorb collections. All but one specimen (LACM 74068) are skeletal imprints in diatomite, with no bones remaining. In LACM 74068 badly fragmented wing bones are still present. Although the skeletal impressions provide excellent data on the body proportions of the species represented, there is very little detail of individual elements preserved. Lacking this detail it has been difficult to make comparisons with isolated bone fragments such as occur in localities in the Monterey Formation of Orange County. The recent preparation of latex molds from some of the imprints has provided clarification in a few instances. The fact that all but one of the species named from the Sisquoc beds have been assigned to extant genera increases the difficulty of making significant comparisons.

The one exception, Miosula media Miller 1925, of the family Sulidae, is known from the Sisquoc Formation by only the obverse and reverse slabs of the holotype skeleton (UCMP 26543). This lacks the skull, but is otherwise fairly complete. M. media was a species with large body and legs, but with relatively shorter

wings and a more curved humerus than in living species of Sulidae. A latex mold made from the holotype now reveals proximal contours of the humerus clearly substantiating Miller's establishment of a genus distinct from the extant sulid genera, Sula and Morus.

Two other species of sulids occur in the Sisquoc Formation. The larger of these, Morus lompocanus (Miller 1925), is close in size to the living Common Gannet, Morus bassanus (Linnaeus 1758) of the North Atlantic ocean, but with longer wings. The holotype (UCMP 26544) and two other specimens of M. lompocanus (UCMP 117309 and 115855) were illustrated by Miller (1925:pls. 4, 7b, 9). A fourth specimen (UCLA 2840) was studied and identified by Miller but never published. The holotype is an incomplete skeletal impression, but the other known specimens include most of the missing elements, including an incomplete skull.

The third sulid, Sula willetti Miller 1925, was a smaller bird, said to be approximately the size of the existing Red-footed Booby, but with different ratios of limb elements. The holotype (UCMP 26542) consists of obverse and reverse slabs containing a nearly complete skeletal impression, including the skull. The holotype and a second, less complete specimen (UCLA 2839) were figured (Miller, 1925:pls. 3, 8).

The shearwaters (Family Procellariidae) are recorded from the Sisquoc Formation by a single species, Puffinus diatomicus Miller 1925, which is similar in general characters and in size to the Recent Black-vented Shearwater, but with shorter wings and longer legs. The holotype (UCMP 26541) is a practically complete skeletal impression. This and another equally well preserved specimen, and a cotype wing were figured by Miller (1925:pls. 1, 2, 7a). At least six other specimens of this

species have been identified from the Sisquoc Formation, only one of which has been published (Orr, ^{R.T.} 1940). The latter specimen (CAS collections), was collected in 1938 by G. Dallas Hanna. It is somewhat smaller than the holotype, but is within a size range comparable to that of the living Black-vented Shearwater.

The other two birds described by Miller were each based on only a single slab. For Cerorhinca dubia Miller 1925 the holotype (UCMP 26546) consists only of the leg bones, said to resemble those of the living Rhinoceros Auklet, C. monocerata (Pallas 1811), though with a relatively longer tibiotarsus and a shorter tarsometatarsus. ~~Probably~~ Also referable to C. dubia is a more recently collected specimen (LACM 74068) from LACM locality 4156) consisting of badly fragmented wing bones. The bones provide new data and resemble those of living C. monocerata. As is true of the holotype leg bones of C. dubia, they fall within the size range of the modern species.

The holotype (UCMP 26545) of the extinct Godwit, Limosa ^a vanrossemi Miller, 1925, is a well preserved skeletal impression, lacking only the skull. It is approximately the size of the Recent Marbled Godwit, but with different ratios in the lengths of the leg bones. This is the only species from the Sisquoc Formation that has not yet been recognized in at least one of the other Miocene rock units in California.

A specimen of a Murre, genus Uria Brisson 1760, in the Brodkorb collection is unrecorded. It consists of the skull and wing bone impressions on two slabs of diatomite. ^{from the Johns Manville Company quarries} The genus Uria has been tentatively recorded (Howard, 1978) from the

Monterey Formation in Orange County (LACM locality 6902). It is also recognized at UCMP Locality 68147 (=LACM locality 4297) in San Diego County referred to the lower level of the San Mateo Formation, which is still under study. ~~The specimens from the three localities are comparable in size.~~

Mammals.-- From the Sisquoc Formation have come the holotypes of three extinct species of marine mammals that we consider to be characteristic taxa of the late Miocene faunal assemblage: namely the large sea lion-like walrus, Imagotaria downsi Mitchell, 1968, the small, generalized Otariid, Pithanotaria starri Kellogg, 1925b, and the sea cow, Dusisiren jordani (Kellogg, 1925a) (a senior synonym of Hallianasa vanderhoofi Reinhart, 1959).

Depression below head narrower + less depressed than in U. aalge. Closer to U. lomvia ~~but~~ in breadth but still with less overhang of head and depression of shaft, + narrower space between pectoral scar + int. rid.

Pectoral scar 10.7 x 4.3

Bone is slender also.

H. est. chond. proc. p. mid. d. en. 11.8 fossil
9.7 480

18.7 fossil
16.9 #697

Coracoid ⁴ Joamien lower with respect to scapular facet
varies in recent
Pacoracoid connection & shaft long + gradual
Close to aalge (lomvia very short)

Depth from pectoral to shaft 11.45 fossil
10.0 (480) - 10.3 (697)
10.2 San Mateo
9.4 lomvia

Scapula with keel broader at tip and ant. Contour protrudes
a broad even curve with flange
ant. contour ~~concave~~ ~~more concave~~
of bone protruding dorsally from the ventral
most protrusion. Contour straight in aalge + lomvia
curves only at pt of anterior protrusion #474 almost (has
some flange)

capitulum length 44.1 U. aalge #80 depth ext. to h. 6.45
" 47.7 in fossil (depth ext. to h. 7.25)
" 43.5 lomvia (1855) depth ext. to h. 5.7

DD

c

Unia from Sanfor laced on latex mold

Australica compared to Lamprea fossil

no Widened area below head - broad flat area, no glange humes

NO *Latissimus dorsi* line straight (as in Univ but not / solid) *hummer*

No

? Carinometacarpus with long process M1. Also possibly more convex ant'ly than in Uria (Can't be sure about contour in Goshawk)

Ext. trachea less distinctly set off from plicae of I
(seemingly lower ~~rather~~ than Goodrich which
is like Unit ←

No. 1. Vlna distal end tendinal pit less depressed in anthracite
very prominent & large in ^{extensive} brookside

Coarctio diffus from Uma ^{of fossil} as procoarctio is more inset from median edge of shell and extends more distally posteriorly rather than slopes medially. In the inset portion Australia resembles P. argus ~~but the former has a flat border?~~

Humours of Australica scar less depressed below
ext. tubercle, broadish close to V^{tr} in depression
+ prominent, Pinguis also has the ext. tubercle
prominent ~~over the~~ ^{anteriorly} prox to the scar

Humerus of Miocephalus compared to U. broadbanti etc.

Narrow area below head depressed about as in broadbanti
The head does not hang over as much.
Flange from scar to head + capital groove ~~is~~ ^{bordering} medially by raised area
BUT Scar less depressed"

Head more prominent in Broadbanti and pectoral scar more depressed, with ext. tubercle protruding more definitely anterior from the scar. Whereas in Miocephalus the scar is flatter and blends more gradually to the tubercle (more like Cephalus)

The ^{anterior} rounding of the shaft is similar in Broadbanti & Miocephalus. The line of the latissimus dorsi is relatively longer ~~than~~ in Broadbanti and more slanted palmar (in Antisiphon ^{one = line}); similar to #1172; Cephalus columbiae.

Miocephalus
line of latiss dorsi
about as in Alca

The line is not as close to the apex of the shaft in Miocephalus as in Uria, however but just doesn't slope off as markedly as in Broadbanti.

Distally, the olecranon process in Miocephalus is tipped with a prominent papilla which is not the case in Broadbanti which ~~markedly terminates~~ ^{is a} protrudes slightly from the shaft at the apex but without a papilla.

Broadbanti resembles Alca more than Uria in the latissimus dorsi line which slopes palmar in Alca. This is not as long as in Broadbanti (or Uria). Broadbanti has the longer line of Uria, the slant of Alca.

U. antiqua int. tub. protrudes more markedly from scar (as in Uria) than in Antisiphon.
NOTE re U. antiqua vs Antisiphon: Distally olecranon process in Antisiphon is straight or concave palmar with apex prominent at $\approx 45^\circ$ slant.
U. antiqua has slight convex palmar contour + less prominent apex
① Antisiphon has longer (but narrower) brachial vimp. (like Alca); Antisiphon like Uria

Comparison with previously described fossil Alcedas. --

Unia antiqua (Marsh, 1870) from the Miocene (Middle?) of North Carolina. Holotype left humerus, Acad Nat. Sci. Phila.
± 13257 (cast available). The cast measures 96.7 mm in greatest length, breadth from internal & external tubercle 18.8 mm, ^{depth of head 7.42} height of ectepicondylar prominence from distal end of external condyle 11.8, ^{13.2 To distal cond. distal} depth of shaft (distally) 8.3. U. antiqua resembles U. adae and U. bonnia and differs from U. badkubi in the greater breadth and excavation of the ^{area} between the pectoral and the ^{capitulum} greater ^{with size of pectoral} ^{formation of the pectoral} ^{scar} and greater depth of the head and more rounded shaft, though the apex of the shaft is more acronal in position. The line of the latissimus dorsi anterior muscle parallels the shaft rather than sloping palmar. Distally the ectepicondylar prominence is slightly convex in palmar contour in contrast to the concavity in U. badkubi and is less prominent at its tip.

It differs from the modern U. badkubi in greater depth of the head and more rounded shaft.



U. affinis has the flange from scar & head found in U. badkubi.

March 1870. Amer. Jour. Sci. vol. 49, no. 146,
article 25, p. 205-217.

U. antiqua

(~~Catarractes~~)

(*Catarractes antiquus* Marsh) p. 213

Notice of some fossil Birds from the Cretaceous &
Tertiary Formations of the United States.

Left humerus from **Tarborough**, Edgecombe Co.
N. Carolina

can't state definitely the age but is Tertiary

Length 96.2 prox br. 21

Vertical diameter of articular head 14.2
" " " " 8.2

Transverse " " " 13.8

Vertical " distal end 8.4

Long. diam of shaft at center 5.2

shorter " " " " "

resembles *Grullinot* lanceolata

head more obtusely rounded, tricip. groove distal
are equal in size

The upper is a bit wider
whereas in *lanceolata* the lower is wider

Marsh 1870 and
1872

505
Am 35

Bradford 1855 Aukhoben

Webster 1910 (Microcephalus) 1943

Porter 1887

Storer 1900

Out XXI Notice of some new Turtles & U. affinis
Post-Tertian Birds

Marsh, O.C.
1872. Amer. Jour. Sci. ser. 3 vol. 4, #22
pp. 256-262 (U. affinis 259)
no illus.

"Post-Pliocene"
clay near
Bangor
Maine

Says it is larger than *Dormia* Rt. humer
smaller than *U. antiqua* unequal size
grooves details.

length 95 mm, max. 20.3, dist. br. 10
gr. diam head 14.0
least " " 7.2
gr. diam sh. middle 7.
least " " 4.2

1876 ser. 2 vol. 4A #146 p. 213

(March 26) A N S P
Uria antiqua, humerus (cast 13357)

length	96.75	narrow	33	pectoral attach.	to length
per br	20.00				26%
prox to int proc	19.06	length	123		
per br head	15.1				
ht acropr	12.2				

humerus Uria humus

length 87.13

per br. —?

prox to int proc — 18.3?

br. head — 13.0?

ht acropr — 10.5

pect. attach br to length

3.9 br 36%

10.6 length

✓ Compare *Pelecanus hippocampus* (Eucaris)
to *Uria lomvia* in case for
entrance to lab.

Measurements of *U. antiqua* given

By Marsh

length 96.2

transverse 21.0

diam prox end

vertical diam 14.2

head

transverse diam 8.2

head

vertical diam 13.8

dist end

(long) gr. diam shaft 8.4

at center

"shorter" diam. 5.0

shaft (center)

480
 U. agilis 86.5
 16.8 17.4
 Length 96.2 mm
 proximal 21 mm
 10.2 10.5 Vertical diam.
 art. head 14.2
 6.3 6.6 Transverse diam
 art. head 8.2
 11.3 11.4 Vertical diam
 distal end 13.8
 7.3 6.8 longer diam
 sh. - center 8.4
 3.9 3.6 shorter diam
 sh. - center 5.0

left humerus - Phil. Acad.

Very similar to Calamagrostis lomvia
 head more obtusely rounded
 tricipital groove (dist.) nearly
 equal in width, the upper somewhat
 wider than the other, but in lomvia
 the lower is much broader
 Ulnar condyle has small, obtuse
 tubercle on interior surface extending
 upward & inward as in Guillemet humerus
 This projection is lacking in the
Guillemet (lomvia)

The lower face of this same condyle (ulnar) also differs from
lomvia in forming a much narrower crescent

Uria affinis Planta Major at humerus larger than lomvia
 smaller than U. antiquus Phil Acad.
 Length 95
 prox diam 20.3
 trans. dist " 10.0
 gr. diam head 14
 least [?] 7.2
 gr. diam sh
 mid. 7.
 least ... 4.2
 differs from U. antiquus;
 shaft anconally below art. head
 is "V"-shaped not rounded
 insertion 2nd pectoral broader &
 margin less elevated.
 Tricipital
 grooves (dist.) unequal in size
 the one on ulnar side much larger

Calif. forest debris

Cerodictyon dubius Lat. Mex.

Baja Cerodictyon minus Cedar Pl.

Brachytrichus pilosum Pl. S.D.

Phychoxanthus tenuis Pl. S.D.

dubius? Cerodictyon sp. small like the
may be C. dubius monacuta. P. Mex. 1945

Aedon ramosus Lat. Mex. 1945

Aedon ulmulus Lat. Mex. 1945
and Mexico V. 30?

Baja? Eudomyces sp. = B, more in size

Aerial sp. 1945

2 larvae size of U. aedon

2 cocoons short prolegs
size of C. pilosum

1 larva size = U. aedon

★ ? Uria sp. humilis loc 6902

? Cephium proctos loc 6906

? Aedon sp. humilis loc 6904
less than a ramosus

★ → Fraterculini-
proctos det. humilis
6902
and 7136
check
more
to compare

USA forest debris

Uria arctica M. Pl.?

Aedon gaudens Pl. Pl.

Microctonus ^{maculipes} related to
Uria. Aedon?

Proctos M 1 - large
Aedon, Uria, Pimpla

short & apterous
Cerodictyon affinis
Eudomyces

check temporal fossa
Cocoon (proctos)

Alcibi character

SKULL

Long, narrow temporal fossa with high posterior ridge running to posterior

orbit

Alca, Uria

deepest in Alca + more medially extended than in Uria

Cerodinae

Endomych NO

Ptycho NO

Cepphus less deep + broader at top

Heterocula NO

Brachy NO

Synthlib NO

Lunda NO

~~Brachy~~

CARPOMETACARPAL

M1 Long prox border straight (not upturned)

Slight notch between it + facet in Alca

Related, notched in Uria, Alca in (ant, contour very slight convex)

" " " Pinguic (ant contour convex)

" " " "

Heterocula

Lunda NO prox most prominent, concave outline down

Cepphus process short + slight upturn, clearly separate from facet

Endomych short + " " " " " "

Synthlib short + " " " " " "

Ptychorampis " " " " " "

Brachyrampis " " " " " "

CORACOID

Alca, Uria, Pinguic
Moderate length process, clear foram, straight median contour

Distal end wide

Long narrow sternal end Uria with ant, contour concave

Deeper in Alca (rather platy distal view)

Deep in Pinguic but very broad anterior corner (moderately Uria tho deeper)

Cepphus
Ptycho + Brachy
short process no foram

Synthlib - ends ok

but convex contour

Endomych ok but

dominant by the distal

process +

Heterocula very long

with low foram

process distal end narrow

turns up at tip

Distal very deep anterior

+ short laterally

" = narrow, deep sternal end

HUMERUS Alca, Uria, Pinguic

Refers pectoral attach, ovoid in shape. Extends with protrudes

anteriorly giving concave contour to the area in lateral view

Broad, flat depression below head

Distally ectepicond. proc. varies - most prom. in Alca (possible)

least in Pinguic (altho some Pinguic like Uria)

into two, given widest in Pinguic + Uria

Both same in Alca

Pectoral attach

Recessed in Lunda + Uria

but not oval. Short

flange to head minor than area

below the head which is. Extends

deeply undercut

Cepphus, flange pectoral

acrosses on space below head

narrowing to area underneath

Ext. tub. doesn't overhang

Endo.

Similar to Cepphus but less undercut

ext + tub doesn't overhang

Synthlib also like Endo but

broader area. Below narrower head

Ptych. ext tub overhangs

depresses pectoral. Dist from

Brachyrampis
flange, no
Ptych. ext tub
dist. corner + tub
prominent

Analysis of Blakbor's Alcid from Lompoc

Best preserved wing bones are of left side humerus, ulna, carpometacarpus, coracoid
 Resembles Uria in slender rostrum

Perhaps closer to U. lomvia than U. aalge in relatively shorter tip.

Keel of Sternum less pointed anteriorly than in U. aalge or U. lomvia (or is this area broken in the fossil?)

Sternum with anterior carinal margin more anteriorly protruded than in U. aalge or U. lomvia.

* Scapula with prominent glenoid facet as in U. aalge and U. lomvia. Distinct from Oceanic fossil UC 88704 which is characterized by narrower, less projected glenoid facet

External side of carpometacarpus with more marked posterior protrusion of M2 in region of ^{proximal} symphysis, than in U. aalge or U. lomvia

Carpometacarpus M3 in distal symphysis of right carpometacarpus (seen in external view on plaque) seems more rounded in contour than in U. aalge & U. lomvia. In this respect suggests UC 88704 from Oceanic. The left carpometacarpus (seen in internal view) looks more squared off, however, ??

Coracohumeral surface of coracoid relatively longer than in U. aalge & U. lomvia. longer than glenoid facet ??

Humerus prox. end rel. broader than U. aalge or U. lomvia ??

Distal end ectocondylar prominence subdued (not projected as in Alca) (this is more clear in specimen than in photo)

Over

Length skull	86.2	(88.2)
skull to base of beak	16.0	(17.8)
Length carpa	43.7	(46.5)
humerus	80.6	(93.7?)
ulna	19.8	20.8
length radius	60.0	66.7
corac. head to proximal end of coracoid	18.8	(19.2)
length coracoid	70.0	(72.7)
corac. head to scapula	16.6	(16.8?)
coracoid from base of humerus to procoracoid	46.7	(48.8)
depth distal end	14.7	(17.8?)
depth distal end	8.0	(9.3?)
ls. scapula	10.1	(10.9)

Ectepicoracylean process projects from shaft
then proceeds distadward in rather straight line (slightly concave)

The projection of this process varies in
individuals of *Uta* species. Some have almost
no projection, others (477) project as in the fossil. Though
the process is not as high from the distal end

U. antiqua projects as in Lampas fossil but
has less concave contour as it proceeds distally
U. affinis contour is like Lampas #1 of process
not quite so projected.

Coacoid with long frame in #494 (4.64 from frame to process?), smaller "slit"
in 477 (4.5 to process). 507 (4.4 to process, moderate, long frame slight bulge on contour of process)

Calymnibaculus distal contour Metacarpal 3 Symphysis to 2 very
even slightly protruded externally at tip
square in 494, 507

Slopes N in 88704 from San Mateo

Notes: size of bony frame layer in at coacoid #507 than left of 507

Long frame in 485 (4.54 to process; 4.7 mm to process in Lampas)

11.2 to tip process for below Glenoid in Lampas

10.7

10.2

10.3

10.6

in 507

in 485

in 477

in 494

The process in *Linda* + *Tridaculus* is long, comes up a bit at tip +
contour is slight convex as it proceeds distally. Very thin shaft
tiny frame situated quite low (5.9 below process in 661 *Tridaculus* and
6.3 " " in 694 *Linda*)
5.35 in Lampas

Coracoid articulation of the sternum extends farther laterally than in
Alca + *Linda* + *Tridaculus* (resembles *Uta*)

Ciphan coacoid frame so close to edge not always free

partial scar in Lampas humerus encloses a triangular area but does not
in *Linda* + *Tridaculus* + not so undulate (no notations)

Alca
with below
head in
Lampas

Comparison with other Tertiary alclides

Vaia (Caberhactes) antiqua March - a south of Honolulu
Honor 18.5

ANSP # 13357 at hand ^{or} ^{for} preserved 20.5, length 95.8 to external side
(96.5 to g. length)

antiqua 12, 2 (Lamp 11, 0) from ext condyle

depth shaft above distal end anterior 8.3, posterior 7.5

U. antiqua resembles Uria in position of external umbilicals

line near medial edge and parallel to it whereas

Longer line ^{slant} ~~straight~~ towards palm side

The pectoral scar is wide in *Lempha* and a flange from
 it goes medially below head. In *U. antigna* the scar is narrow
 as in *U. aalge* & does not have a flange going forward head
 Lempha width to pectoral scar 3.8, length 7.9?
 length to ext. tub. 12.1
 length to head 11.5

March 1892
U. affinis is from plants of Banyan, Java

ANSP 13358

antiqua appears to have a narrow ridge of
of anconal ridge well marked of pectoral scar rather than
running directly below it. ^{as in antiqua} On surface the ridge is less prominent
but less so than in ant. g. small

convex (Una straight

The broken humerus of the left side lies with the proximal end presenting an aspect slightly lateral of anconal, while the distal fragment is turned so as to expose more of the external side. In length the fossil element falls within the size range of both U. aalge and U. lomvia, ^{the Recent species} but ^{and prox. breadth is equalled in the Alaskan specimens} is proximally broader, ^{with but none of the Calif. U. aalge} with a less depressed shaft. ^{The shaft is more rounded.} The pectoral attachment is broader, with a flange extending below the head, ^{the breadth of the pectoral attach. is equalled in 6 of the Alaskan specimens.} and narrowing the area between the pectoral attachment and the median crest. One specimen ^{A flange in various degrees of extent is noted in a few specimens of both sps. but none as evenly contoured as in the fossil} of U. lomvia has a suggestion of this flange, but it is of much less extent. As observed in the latex mold, the head ^{humeral appears to be} is less deeply undercut ~~in the fossil~~ than in the Recent species of Uria. The ^{depressed} ovoid shape of the pectoral attachment resembles the condition in Uria, and when viewed externally, the attachment has a concave anconal contour with the external tuberosity projecting anconally. These characters, typical of Uria, are reflected, also in Alca, though the pectoral attachment is less depressed in the latter genus. The line of the anterior latissimus dorsi muscle is long as in Uria, but the slope is more markedly palmar and is emphasized by the rounding of the anconal aspect of the shaft. Distally the external tricipital groove is sharply rimmed. The ^{width} extent of the internal groove is not clear, but it appears in the latex mold to be broader than the external, thus resembling Uria as contrasted, for example, with Alca. The tip of the ectepicondylar process is more prominent than in most specimens of Recent Uria. Though ^{a few} two specimens of U. aalge approach the same prominence, all are less elevated above the distal end with the process less vertically placed with respect to the shaft.

The ulna and radius are crushed proximally and provide little information other than approximate length of the radius.

(Cenchrus ciliaris)

Skull - straight beak (others with hump) ^{Eudomychus} ~~Cephus~~

Euchomyces
Cephalus

~~Strongly raised ridge running forward from~~ Deeply cut narrow
temporal fossa with
~~temporal fossa wide in Cephala, indistinct in~~

Cracoid -

Midgrade lmy well protected from shaft well developed procrasoid
~~well developed~~ procrasoid with foramen - with foramen
 Broad base, relatively narrow base

Capromelasma

rubescens
 Process
 ^ Process on 1 long, ~~with evenly rounded anterior contour~~ (no upturn)
~~no obvious separation~~ distinct upturned tip.

Humerus - On one of the ^{lateral} molds the distal area shows up well & in this the ~~distally the~~ internal tricipital groove appears & be wider than the external. (true in Umi + Cephalus (more even in Cephalus, the ridge is not narrow proximally by a ridge which at the base widens the dist. prox. ridge)

consp.  Cephelus
 ex. in
 trapdoor

Cephus differs also in separate ~~front~~ ^{scaler carabini} prominent process M.

and short picrocaricid - no foramen

2800

2.80

26.20

3000

300

27.00

2620

1,80

9000

1890

1400 = 25.00

280

11 20.00
20.00
1.70

$$1500 = 2000 - 500$$
$$15 \overline{) 27.00}$$

3000
28.20

300

2,70

$$15 \overline{) 27.00}$$

10

will

Discussion.-- As exposed on the diatomite slabs the elements on the left side of the skeleton are the best preserved. Similarly, the left side of the skull & ^{posterior of the cranial} ~~sternum~~ ^{muscle} are exposed. The ~~sternum~~, ~~however~~, has been damaged so that ~~the central~~ rather than the ventral surface of the costal ridge is exposed. The area of the costal ridges is ^{pushed forward &} folded onto the carine ^{so that from this} ~~surface~~ ^{point to the dorsal end} ^{is exposed} ~~the dorsal surface of this area~~ ^{and}. Because of this damage, the ~~cranial sulcus~~ ^{is} ~~the cranial sulcus~~ ^{is} ~~total length as given above~~ ^{could be as much as 10m} ^{than} the actual length of the sternum.

Long for Uria skull measured in slab 93.7 or length
 ht at ~~base~~ front nasal bridge 19.5 (dorsal 91.5 long th)
 ht anglen to top of skull — 34.7
 length jaw from bridge to tip lower jaw 52.3

Coracoid slender

too deep not usually not underling → Interclavicular and Lunda No
 This bone has the long processes + foramen well below
 scap. facet.

Cephalon is OOT because process short + no foramen
 stout end fairly wide but widest point ^(subantennal) is more abrupt
 front is broadly rounded

Uria + Alca are close tho Alca is deeper anterior
 at sternal end + not as broadly rounded. Uria is broader
 curved as in fossil (sternal part) tho greater whether
 it extends as far laterally (the facet part)

Carpalometacarpus M1 process evenly rounded ant. contour
 in fossil — same in Uria, Alca is close but there
 is a slight indentation on ant contour above the facet for Dig.
 more abrupt than in Uria

Cephalon have clear process ant. just out beyond facet
 + Endomychura + Syntelictocarpus

In Interclavicular + Lunda there is a broad concavity in the
 ant contour with prox end up tilted

Humerus — flange from pectoral scar extends to head
 This char appears in Lunda + Interclavicular but in the
 fossil the flange is flattened against the shaft
 Ectepicond. process usually rounded (slightly constricted) up to shaft in Uria but in Lunda + Alca
 Ext dist gone narrower in Interclavicular + Lunda + Uria.

narrow shaft in Cephalon — flat in Uria but deep
 narrow + flat in Lunda + Sub.

Cuneus palmar distally in Uria + Alca (Alca may present
 ectepi)

Endomychura pectoral scar encroaches on head as in fossil
 space below head narrow. Head even wider in hypodermis, comes
 down (as in fossil?) in cranium

Syntelictocarpus
 Endomychura large
 foramen in well formed
 process but
 is nearer
 scap facet

narrow
 shaft
 Syntelictocarpus
 pect. scar does not
 encroach
 or leaves
 space below
 head large
 confined than
 Endomychura

U. anti qua
 process comes
 contour but
 process more
 prominent than
 max Uria
 goes up straight
 as some specimens
 at base of
 contour +
 then strikes
 out parallel
 as in fossil
 This fossil
 proportion
 is smaller

Stannum caudal groove

Snout & front, very deep ant'ly - less extent laterally
~~lateral~~ ^{anterior} ~~by~~ fossil

Una & also close to fossil - have more lateral extent

Una closest because the anterior part is less protruded

& more gradually (broadly) rounded as in fossil

Eudomyxus, groove extends well laterally but is
more abruptly shut forward internally

Eudm

Longfor fossil

humerus resembles Eudomychura hypoleuca

① in narrow area below head and "flange" (or scar itself) extending over head

② Line of latissimus dorsi slants palmar in hypoleuca, less so in ^{craverii}

③ Epitrochylar prominence concave in palmar contour, prominent (but ~~is~~ ^{is not papilla} at prox. tip. ^{in hypoleuca but papilla in craverii})

④ Shaft ~~unconspicuously~~ ^{differs in Eudomychura, it is less rounded} from Eudomychura hypoleuca

Calpurnetaceus differs from Eudomychura hypoleuca

NO ① long process MI (Eudomychura has short prominent process in E. ^{near middle} ^{process})

? Coracoid differs from Eud. hypoleuca & craverii - in which the procoracoid is less prominent posteriorly or apically;

NO Skull with straight beak but Eudomychura craverii has no ridge rising above supraoccipital (fossil has ridge)

NO Sternum ^{Eud. with} straight ant. contour as in one (fossil rounded ventrally)

Longfor fossil resembles Cephus columba

humerus { ① ^{humerus} narrow area below head, + flange (= part of ^{relative to scar?} ^{in Cephus})
② line of latissimus dorsi slopes palmar
③ Epitrochylar prominence about same prominence the contour is straighter in Cephus

Skull 4 anterior carinal contour rounded + ant. flange prominent ^{in one only}
snout { 5 straight beak - straight from skull (no, it angles at fronto-nasal suture - ^{like fossil})
6 definite ridge marks ^{anterior} border of supraoccipital

NO But - ① Calpurnetaceus has more prominent MI process in Cephus
② Coracoid has abated process in Cephus
procoracoid is short in Cephus

Brachygnathus straight beak but not ridge portion

No foramen in coracae

prominent process M I

Synhelicorhynchus fairly straight beak the deposits down curve
very slightly posterior side

process M I distinct

coracoid with long procoracoid but foramen higher

sternum straight and conical

No Ceratodus beak hump abit, no posterior ridge

coracoid with very long procoracoid but no
prominent process - foramen low

No

No

Calymene baccata with prominent process M I

the inner flange to beak + area narrow

But very excavated below beak +

Line of labialium down straight as in Uria

Lompoc alcid -- possible distinctions from modern Uria

Keel of sternum less pointed anteriorly

Anterior carinal margin of sternum more anteriorly protruded

Carpometacarpus-- external side with more marked posterior protrusion of M2 in region of proximal symphysis

Coracoid -- coracohumeral surface relatively longer -- appears to be longer than the glenoid facet?

Shorter premaxillary region?

Humerus with more distinct capital shaft ridge than U. aalge (ridge seems more evident in U. lomvia though less marked than in the fossil)

Humerus with attachment of latissimus dorsi more lateral in position

Lompoc alcid compared with UCMP 88704 from San Mateo Fm at Ocenaside

Scapula in 88704 has narrower glenoid facet than in modern Uria -- and less protruded. Lompoc specimen appears to be very prominent (if I am interpreting the correct bone in the photo -- ~~just between~~ ~~the two~~ between the two coracoids), hence unlike 88704

The fragment of carpometacarpus in UCMP 88704 shows the distal contour of M3 to be more rounded than in modern Uria sps. The external view of carpometacarpus on the Lompoc specimen suggests this condition, but the other carpometacarpus on the Lompoc specimen seems more square in outline.

Coracoid of 88704: procoracoid joins shaft at internal edge, differs from Australca in which the ~~procoracoid~~ junction is more dorsally (posteriorly) placed.

Unit aaleg ally				length web	length to olecranon	length to olecranon	length to olecranon	length to olecranon	length to olecranon
length humerus	length capor	length capor	length capor	length capor	length capor	length capor	length capor	length capor	length capor
694	86.2	16.9	43.4	102.8	64.2-65.0	11.5	30.0		
480	83.3	16.2	44.0	99.9	62.2-63.4	11.9	28.8		
✓ 674	91.4	✓ 17.4	✓ 46.8	109.5	62.8-63.4	11.5	30.8		
485	86.7	16.7	43.4	104.3	63.2-64.0	11.2	28.9		
494	90.3	17.9	43.7	107.6	63.4-64.3	11.5	30.9		
477	85.7	16.8	43.7	106.9	63.4-64.3	11.3	29.2		
U. linnii	86.5	16.9	44	105 broken	76.0	11.2	29.0		
Alca torda	74.6	16.1	39.7	89.3		11.2	28.0		
1849	78.3	16.9	—	86.4		11.2	28.0		
1857	78.3	16.9	—	86.4		11.2	28.0		
Fossil	87.0	17.4	47.0	104.3	63.2-64.0	11.2	28.9		
58704	87.0	17.4	47.0	104.3	63.2-64.0	11.2	28.9		
Lompe	87.0	17.4	47.0	104.3	63.2-64.0	11.2	28.9		

Humeral with attachment of latissimus dorsi more lateral in position than in modern U. linnii. (ridge seems more prominent in U. linnii though margin is distinct capital shaft ridge than U. linnii)

The fragment of carpometaepus in UMP 88704 shows the distal contour of M3 to be more rounded than in modern U. linnii. The external view of carpometaepus on the Lompe specimen suggests this condition, but the other carpometaepus on the Lompe specimen seems more square in outline.

41.5
22.9
65.4

65.4
24.6
90.0

65.4
24.2
89.6
507.25
45
68

42.4
23.4
65.7

42.4
23.4
65.7

23.4
41.3
64.7
86.4
103.4
21.4
45.4
6.8

25.4
64.8
90.2

25.4
64.8
90.2

	length snout	proximal length humeral	external length carpometacarpal	length skull + brain	great length ulna	breadth scapula	length of coracoid from procoracoid to external olecranon	length coracoid to proximal ulna	length coracoid from proximal ulna to external olecranon	length of pectoral setae of humerus	length of pectoral setae of humerus	length of mandible	length of mandible at level of posterior denture	length of mandible at level of anterior denture	length of mandible at level of posterior denture	length of mandible at level of anterior denture	length of mandible at level of posterior denture	length of mandible at level of anterior denture
Unio aegy																		
# 674	91.4	17.4	46.8	109.5	68.9	11.5	30.8	46.1	37.9	10.3 x 13.3	10.8	7.0	27.2	9.5 11.0	20.7	23.0		
# 480	83.0	16.3	43.8	99.9	63.5	11.0	28.8	43.7	34.3	11.1 x 3.1	10.4	6.4	25.9	9.4 11.1	18.9	20.8		
# 697	86.3	16.5	43.3	100.3	65.7			42.8	34.9	11.2 x 3.3	10.0	6.5	26.9	9.6 11.3	18.8	22.2		
Lombr aegy	85.6 90.4	18.8	47.4	90.4	67.7	10.7	27.5	43.8	37.2	10.7 14.2	10.5	7.1	24.9 25.0	9.6 11.0	20.3	21.4		
San Mateo species	—	—	—	—	62.4	10.6	28.1	—	—	—	—	—	—	—	—	—	—	—
Unio aegy	86.4	16.6	44.2	95.6	67.1	11.3												
Unio aegy	86.5	16.1	43.8	—	68.2					10.6 x 3.4				9.6 11.0	20.3	23.1		
Unio aegy	89.3	16.9												10.1				
" 477	86.25	16.3	broken		65.4									10.1				
485	86.6	16.25	43.4		64.7									9.7				
494	90.35	17.7	45.8		69.3									10.0				
674	90.5	17.6	46.8	100.2														
N. antiqua	96.7	19.45												12.6				
U. affinis	94.8	18.9												10.9				

Una Oct 13, 1972

Caracod

thumens

blue cont'd

	mus a post's length to sternal end	b ht to pro- corac	c length from pro- corac to sternal end	d heart to sh ant'ly	Length	mus ht	ht acromi- oclavicle to mid deltoid acromi- oclavicle	a few meas from ↓ is bones in this group	gr length	palma- to prop	to mid sh	depth scap plate	length to acromi- oclavicle						
Left 85704	21.2	—	—	4.45	87.0	18.4	11.2	acromioclavicle u. a. d. g.?	64.75	8.7	3.9	6.35	63.7						
Right 85704	21.0	3.6	24.7	4.45				" "	64.35	7.85	4.1	6.5	62.9						
U. a. d. g. 3321	19.3	4.0	24.3	3.9				u. s. p.?	66.8	9.0	4.5	6.45	65.6						
U. l. m. a. ✓ 85705	21.5	3.9	26.2	4.1				" "	64.2	8.5	4.1	6.3	62.7						
U. a. d. g. ✓ 697 R	21.5	4.1	26.9	4.3				" "	65.2	8.0	4.1	6.1	64.0						
507	21.0	3.9	27.0	4.3	89.3	16.9	10.1	U. l. m. a.?	71.6	8.9	4.0	6.5	70.3						
477	20.5	4.8	26.5	4.2	86.25	16.3	10.1	"	72.1	9.1	4.1	6.2	70.8						
485	19.8	4.45	25.85	4.2	86.6	16.25	9.7	"	72.85	9.3	4.35	6.9	71.65						
✓ 697 L	20.7	4.65	26.7	4.3					72.85	9.4	4.0	6.4	71.2						
15.75 Seat back to head 494	21.1	4.5	26.5	4.7	90.35	17.7	10.0		73.9	9.0	4.1	6.3	72.4						
Alaskan R	21.65 22.1	3.8	27.5	4.8	96.7	19.45	12.6		71.5	9.0	4.2	6.45	69.9						
L	23.4	4.1	28.4	4.5	94.8	18.9	10.9		71.3	8.7	3.8	5.95	70.1						
R	22.7	5.3	29.0	5.2					71.4	8.9	4.2	6.35	69.8						
R	22.1	3.2	26.4	4.2					73.3	8.8	4.0	6.35	71.0						
Rehins p. 1010	21.0	4.5	29.0	4.7	90.0	17.7	10.0		71.1	8.9	4.25	6.25	69.8						
Female 85706	21.7	4.5	29.0	2.7	3.4	79.5	47.4	59.6	70.48	8.9	4.3	6.5	68.9						
Alaskan 85706	21.7	4.5	29.0	2.7	3.4	79.5	47.4	59.6	70.48	8.9	4.3	6.5	68.9						
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Alaskan 85706	21.7	4.5	29.0	2.7	3.4	79.5	47.4	59.6	70.48	8.9	4.3	6.5	68.9						
Alaskan 85706	21.7	4.5	29.0	2.7	3.4	79.5	47.4	59.6	70.48	8.9	4.3	6.5	68.9						
Alaskan 85706	21.7	4.5	29.0	2.7	3.4	79.5	47.4	59.6	70.48	8.9	4.3	6.5	68.9						
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Alaskan 85706	21.7	4.5	29.0	2.7	3.4	79.5	47.4	59.6	70.48	8.9	4.3	6.5	68.9						
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Alaskan 85706	21.7	4.5	29.0	2.7	3.4	79.5	47.4	59.6	70.48	8.9	4.3	6.5	68.9						
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Alaskan 85706	21.7	4.5	29.0	2.7	3.4	79.5	47.4	59.6	70.48	8.9	4.3	6.5	68.9						
Alaskan 85706	21.7	4.5	29.0	2.7	3														

2045-Q Via Mariposa East
Laguna Hills, Calif. 92653
August 28, 1980

Dr. Lawrence Barnes
Section of Vertebrate Paleontology
Natural History Museum of Los Angeles County

Dear Larry:

The enclosed manuscript, entitled "A new species of Murre, genus Uria, from the Late Miocene of California (Aves: Alcidae," is submitted in the hope that it will be acceptable for publication in Contributions in Science.

Three of the photographs will have to be slightly reduced to fit the page size, figure 1 (full page), figure 3 (full page), figure 4 column width. Figure 2 can fit the page size by using only that part below the line drawn in the margin. This photograph is on loan from Dr. Brodkorb, so it should not be cut. I have the negatives for figures 1, 3 and 4, if it would be better to have the photographs themselves reduced rather than requiring the printer to reduce them.

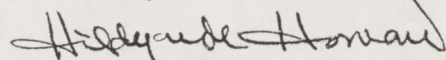
} note
TOP
marks.

REVIEWERS: Before completing this final version, the manuscript was submitted to Dr. Pierce Brodkorb, Department of Zoology, University of Florida, and Dr. Storrs L. Olson, Department of Birds, National Museum of Natural History. A copy of Dr. Olson's letter of reply is enclosed. I have followed his suggestions with respect to the generic assignment and the species diagnosis. Regarding his suggestion of a close up of a portion of figure 4, I felt that this area is questionable at best, and shows sufficiently well in Figure 3. I have now discussed the area in the text and referred to figure 3.

Dr. Brodkorb's reply was included in a letter concerning other matters. With respect to the manuscript he said, "As you suggested I tried very hard to find ways to improve your MS but was not very successful. The few minor things will be listed below." These included a couple of typographical errors and suggested rewording, which I have taken care of. He was also concerned about the size of the Recent murre as cited in the table and suggested I include Mean as well as Max. and Min. I have now done so.

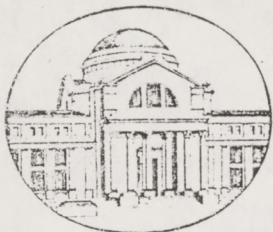
Dr. Kenneth Campbell, of the Museum staff, read an early version of the MS and made helpful suggestions. Perhaps he would be willing, now, to read the version here submitted.

Sincerely,



Hildegard Howard

Twenty-one pages, including Table, plus four photographs



National Museum of Natural History • Smithsonian Institution

WASHINGTON, D.C. 20560 • TEL. 202-

5 AUGust 1980

Dr. Hilegarde Howard
2045-Q Via Mariposa East
Laguna Hills, CA 92653

Dear Hildegarde,

✓ Your manuscript describing Uria brodkorbi arrived yesterday and I got to it as soon as possible, since I am leaving on the 11th for three weeks of fossil collecting on Antigua and Barbuda. The new Uria is extremely important and I am very excited about it. I hope that there won't be any delays with getting it in print. I have appended a few minor comments on the manuscript. My only major criticism would come in my different concept of what constitutes a diagnosis. I consider that a diagnosis should be comparative and should state concisely how the new taxon differs from other taxa at the same level.

✓ ~~XXXXXX~~ Since the taxon you are describing is a new species in the genus Uria the diagnosis should state how the new species differs from other species of Uria. You may wish to establish how you determined that the new species is referable to the genus Uria before entering into the naming and describing of the new species (as, for example, my description with Alvarez of Mergus miscellus).

✓ But this is merely a difference in procedure and is of course optional. Even from the ~~XXXXXX~~ Xerox copies, the photographs of the holotype look superb. What a fine specimen. The difference in width of the tricipital grooves on the distal end of the humerus is very important. On this basis I can say that none of the thousands of alcid humeri from Lee Creek or Bone Valley belong in the genus Uria. Even though the distal end of the humerus is somewhat obscured in the type of U. brodkorbi, would it be possible to include a close-up detail of it as an inset for Figure 4?

I will certainly look forward to seeing this paper in print; it is a very valuable contribution.

Best wishes,

Storrs L. Olson
Division of Birds

M E M O R A N D U M

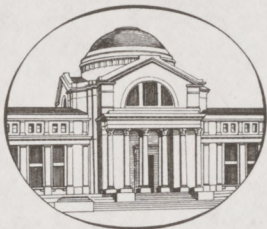
TO: Dr. Hildegarde Howard
FROM: Robin A. Simpson *RAS*
RE: "A new species of Murre, genus Uria"
DATE: February 4, 1981

I recently circulated your manuscript to the Contributions in Science Editorial Board for a second time, at the request of John Harris and Ken Campbell. It appears that the most serious objection to the manuscript - the fact that the holotype of the new species is in a private collection - cannot be resolved at this time. The Board and I feel quite strongly that we cannot consider publication of the manuscript in Contributions under these circumstances.

I am returning the manuscript and the reviewers' comments, with the hope that the latter may speed acceptance of the manuscript by another series. I am sorry we are unable to publish it in Contributions.

RAS/gk
encs.

*Accepted by Soc Calif Acad Sci in Feb. 1981
and published in Dec. 1981 (Vol 80 #1, pp 1-12)*



National Museum of Natural History • Smithsonian Institution

WASHINGTON, D.C. 20560 • TEL. 202-

5 AUGust 1980

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2045-Q Via Mariposa East
Laguna Hills, CA 92653

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✓ I will certainly look forward to seeing this paper in print; it is a very valuable contribution.

Best wishes,

Storrs L. Olson
Division of Birds

UNIVERSITY OF FLORIDA

GAINESVILLE, 32611

DEPARTMENT OF ZOOLOGY
223 BARTRAM HALL
904-392-1107

10 July 1980 (at home)

Dear Hildegarde,

Many thanks for sending me a copy of your MS on the Uria slabs and for dedicating the species to me. You need not have felt obligated to do this, but I appreciate the honor of adding it to my "private zoo," as Alex used to call it. A murre is much better than some of the other things in my "zoo," including a fossil crab and a blood-~~parasitic~~ protozoan! Do you think people are trying to tell me something?

As you suggested I tried very hard to find ways to improve your MS but was not very successful. The few minor things will be listed below.

A character state is almost the same as what we used to call a character, or more particularly a distinguishing or differentiating character. I think it is one of the few good things about numerical taxonomy and cladism. I tried to get the term into my paper in your Festschrift (which as far as I know has not yet come out although page proofs were corrected and reprints ordered); but Ken deleted the "state."

For example: in your MS the shape of the distal end of M III would be a character of all murrets; the char. state of the n. sp. would be sloping distally, but in other species it would be forming a distinct right angle.

Diana left this a.m. for the AOU meetings and then goes briefly to California to visit her parents. She probably wrote you that the Leakey Foundation gave money for 6 months salary; I appreciate your help with this.

Best regards as always,

Prin

Comments on MS.

- ✓ line 3 of introduction: insert comma after California subfossils ✓
- p. 2: Aleut specimens: These Amchitka/should be U. a. inornata, at least in part. Would it be worthwhile to differentiate them from U. lomvia and include them in the table of measurements?
- p. 3, lines 2-3 of diagnosis: Transpose short to follow nares. *Whole diagnosis changed*
- ✓ p. 4, humerus line 3: Change depth to length or height.
- ✓ p. 10. CONCLUSIONS misspelled.
- ~~Tax~~ Table I. I can't understand why your inornata run smaller than your californica, whereas the reverse is the case with my birds, and ~~this conform~~ to Bergmann's rule. Could your inornata all be ??? Or is it mainly a difference in the bill? Anyway, it would be helpful if you included means in the table.

P.S. Yes, this is the size of the FSM Bulletin. I think your format is o.k. but I don't have a recent number with a Lit. Cited style in it. Don't worry about it-- editors like to have something they can change!

Will run this down to the PO now so maybe it will get there in a week or two.

We don't have a fiscal year budget yet-- there is plenty of money in the state treasury, but the governor vetoed the U. budget as it had some very controversial matters that the politicians put in. He has asked for a court ruling.
P. 5, Wing phalanges: Use Roman numerals for digit numbers, Arabics for phalanges.

2045-Q Via Mariposa East
Laguna Hills, CA 92653
September 8, 1980

Dr. Storrs L. Olson
Division of Birds
National Museum of Natural History
Smithsonian Institution
Washington, D.C. 20560

Dear Storrs:

Thank you so much for your prompt review of my Lompoc alcid manuscript. I didn't write sooner, knowing you were off to Antigua and Barbuda.

I was delighted with your comment on the diagnosis. That's the kind of diagnosis I always used to write. But I had seen so many lately that seemed to reserve the comparisons for "Discussion." Anyway, I lost no time in redoing the Diagnosis, and am much happier with it. I also changed the heading under Systematics including Class, Order, Family, Subfamily and Genus and then discussed the characters of the genus Uria before proceeding to the species description.

The manuscript was turned in to the Editor of LACM Contributions in Science on August 28. I included a copy of your letter with the manuscript. I hope this will suffice from you, so you won't have to be bothered by a request for further "referee".

Sincerely,

Hildegarde Howard

MEMORANDUM

September 24, 1980

TO: Robin Simpson, Editor

FROM: *L. G. Barnes*
Lawrence G. Barnes, Curator, Vertebrate Paleontology

SUBJECT: HILDEGARDE HOWARD MANUSCRIPT, "A NEW SPECIES OF MURRE....."

The manuscript is suitable in content, format, and significance for Contributions in Science. I went through the draft rather carefully to note problems in grammar and logic. You will notice that I've made a lot of notations, but this does not indicate that the m.s. is in desparately rough shape. One more typescript should clean it up. The logic, descriptions, and conclusions are basically quite sound. Since Dr. Howard is honorary staff, the m.s. is a number 2 priority.

Since we already have comments from Drs. Olson and Brodkorb, I would let their previous reviews stand. Dr. Brodkorb's review was superficial, however, but I think we should retain him on the committee anyway as a courtesy. I will sponsor the m.s. for the V.P. Section, so the Review Committee can be listed such:

Lawrence G. Barnes, Chairman
Pierce Brodkorb
Storrs L. Olson

Additionally, I would like to suggest that Ken Campbell review the m.s. and that he be listed as a fourth member of the review committee. If he consents to be on the review committee, he should have my review copy and a clean one to mark on.

Some of my expanded comments are as follows:

Abstract: Make it more informative. Can you state size of individual, relationships to other species? Significance: i.e. are there other species of Uria known as fossils, is this rare and/or unusual? Use common names of the fossil and Recent species that will be most commonly referred to in the text.

- p. 7 Holotype is not in a permanent scientific collection (listed as Pierce Brodkorb No. 7960). ICZN rules require that Dr. Brodkorb catalog the specimen in a scientific institution so Dr. Howard can cite the holotype.

- p. 8 Is there any history of how Dr. Brodkorb acquired the specimen in order to document its original provenience? What is the authority for the locality data?
- p. 13. There are references on the age of the Yorktown (presuming that is the source of U. antiqua), which can be cited here. Hildegard can use my card files for these references.
- p. 15-16. I've added species names here because we are talking about species. Species are referred to genera, and specimens are referred to species.
- p. 17. Any comments on how U. brodkorbi is more primitive than modern species and which one it is closest to? Zoogeography - this is the first Pacific fossil murre.

Figures. Draft a scale line on each photograph. About 5 cm. would be useful.

Throughout the text, comparisons are made with modern murre. This is totally appropriate, and the modern comparative material is precisely identified to species, and in some instances, to subspecies. In the diagnosis and comparisons, however, the modern specimens are variously identified as:

Uria
Uria aalge
Uria aalge californica
Uria aalge inornata
Uria lomvia
Uria lomvia lomvia
Uria lomvia arra

This presents a problem in logic. The fossils are only identified to species, i.e. Uria brodkorbi, U. antiqua, U. affinis, U. ausonia. For consistency, morphological characters used to define species should therefore be kept strictly on a species to species level. A bone of U. brodkorbi should not be compared with a bone of the genus Alca, but with a bone of a species in the genus Alca. Similarly, without adequate explanation, if a bone of U. brodkorbi is compared with one of U. lomvia^{lomvia}, then there may be a question in the reader's mind whether it differs likewise from one of U. lomvia arra, or whether U. lomvia lomvia and U. lomvia arra are indeed different in this character. I believe that probably the way this should be handled is that unless the subspecies really do have different morphologies, they should not be differentiated in the comparisons, but they should be differentiated in the "Materials and Methods" section to indicate which populations the modern comparative specimens were derived from.

The measurements section on p. 9 is repetitive with Table 1. Table 1 should be retained and p. 9 should be eliminated or reduced. The five measurements in Table 1 noted by asterisks as needing further explanation for methods of measurement could be handled in one of three ways. 1) Enlarge these one-line measurement descriptions as given on p. 9. 2) Make five numbered footnotes to

Table 1 to explain the measurements. 3) Number the measurements in Table 1 from 1-12 along the left margin and refer to the five that need more explanation on measurement methods under the section "Methods and Materials". 4) Add the other measurements on p. 9 to the table.

It should be noted in the margins of the text where figures and plates are to be located.

dc

cc: D.P. Whistler
K. Campbell

July 30, 1980
Stars Olsen
remains herein

Uria,
A NEW SPECIES OF MURRE FROM THE LATE
MIOCENE OF CALIFORNIA (AVES: ALCIDAE)

By Hildegard Howard

Abstract: Uria brodkorbi new species is described from impressions of skull and incomplete skeleton on two slabs of diatomite from the Sisquoc Formation, Late Miocene, near Lompoc, California. This is the seventh ^{of bird} avian species to be described from this ^{formation?} area and the second of the family Alcidae.

INTRODUCTION

Through the generosity of Dr. Pierce Brodkorb of the University of Florida, an unrecorded avian specimen from the diatomaceous beds near Lompoc, California has been made available to me for study and description. It consists of the impressions of skull and anterior elements of the skeleton on two contiguous slabs of diatomite, and represents a new species of bird of the family Alcidae.

Although more than twenty bird specimens, ^{impressions} ~~representing~~ ^{these diatomite} ~~six~~ species, have been collected from the Late Miocene ^{from this area} deposits at Lompoc, the only alcid heretofore recorded is holotype of Cerorhinca dubia Miller 1925, ^{described here} The holotype of C. dubia consists of the impression of leg bones only. More recently, the Natural History Museum of Los Angeles County obtained a small slab containing impressions and fragments of wing elements that appear to be referable to C. dubia. Both this specimen and the holotype obviously represent a much smaller species than the ~~Brodkorb~~ specimen now at hand.

taken under certain lighting conditions?

In photographs of the Brodkorb specimen the images of the impressions becomes reversed and appears as solid bone. In this aspect the skeleton so closely resembles that of the present-day murre, genus Uria, that had the deposit been of Pleistocene age, it would likely be assigned to Uria aalge. See figures 1 and 2

More detailed study has been provided by making latex molds from the impressions. Even here the over-all resemblance to modern Uria is striking, particularly in the straight beak, the long process of metacarpal I of the carpometacarpus, the well developed procoracoid of the coracoid and the overall proportions of the skeleton. Certain details, however, stand out as important differences from the living species. A new species is, therefore, here described.

Comparative Material Available.-- Fossil: Uria antiqua

(Marsh 1870) and U. affinis (Marsh 1872), casts of holotype

humeri; Australca ~~sp.~~ Brodkorb 1955, unrecorded specimens of

proximal and distal ends of humeri and ulnae, complete coracoid

and proximal end of carpometacarpus from the Lower Pliocene of at Lee Creek,

North Carolina; Miocepheus ~~sp.~~ Wetmore 1940, unrecorded humerus

from the Calvert Formation, Maryland. Recent: Complete skeletons

of Uria aalge californica 17, U. a. inornata 6, U. lomvia arra

10, U. lomvia lomvia 2 (one lacking skull); Uria sp. disassociated

elements from Aleut middens in Amchitka, Alaska, 48 humeri, 46

coracoids, 36 carpometacarpi. With the exception of the Dovekie,

genus Alle, all other North American genera of Alcidae were also

compared
reviewed.

which occurs along the coast of Alaska
although it is more similar to U. lomvia

catalog nos.?

later you say that the bill is more similar to U. lomvia

ANSP #13358

ANSP 13357

(USNM 192558 T 175-136)

(USNM 193325 T 21562)

(USNM 215513)

(USNM 215506)

Yorktown Formation

catalog no. USNM 25668

(LACM 215506 right)

(LACM)

(LACM)

(LACM T PB)

(LACM)

P?

(CSULB)

SYSTEMATICS

Uria brodkorbi, new species

* Holotype.-- Impressions of skull and anterior portion of skeleton on two slabs of diatomite, Brodkorb collection number PB7960. Slab PB7960A contains the skull in lateral aspect and seven cervical vertebrae; slab PB7860B contains the incomplete furcula, sternum, coracoids, scapula, ribs and wing bones.

Plastotypes.--Two latex molds, made separately from the holotype, PB , and LACM .

Formation and Age.-- Sisquoc Formation, Late Miocene.

Locality.--Johns Mansville diatomite quarry near Lompoc, California. Collector? Date (approximate) of collection?

Diagnosis.--Skull relatively short, with ~~sturdy~~ short premaxillary symphysis; tip of beak anterior to nares; lower jaw dorsoventrally deep, with contour deepening in area of angular. Sternum broadly curved anteriorly with tip of carina truncated and anterior carinal margin protruded anteriorly; shape of coracoidal sulcus suggesting long, narrow sternal facet of coracoid. Coracoid with well developed, sharply projected procoracoid; scapular facet deeply cup-shaped, glenoid facet broad. Humerus with area below head, between pectoral attachment and median crest, ~~capital groove~~ narrow; pectoral attachment broad, with flange extending in even curve mediad below head; line of latissimus dorsi anterioris muscle nearly 20 mm in length, slanting palmar from distal edge of pectoral scar along external side of shaft; proximal portion of shaft rounded rather than compressed; ectepicondylar prominence, viewed externally, nearly vertical with respect to the shaft, with tip projecting from shaft at obtuse angle. Carpometacarpus with Metacarpal III ~~in~~ distal metacarpal symphysis sloping distally rather than forming distinct right angle (as in what?)

Give N.Am. land mammal stage equivalent and foraminiferal stage equivalent

Etymology?

is it this true of most birds? How is it diagnostic?

see yellow Review

Measurements.--Because of the condition of the specimen, many of the measurements are based on the latex mold, with the skeletal impressions used as a check. At best all measurements are approximate.

Skull: greatest length 93.6 mm; length of ~~bill~~^{rostrum} from tip to ~~nasal process of premaxillary~~ 53.0 mm; length of premaxillary symphysis anterior to nares ⁹23⁵ mm; greatest depth of ~~lower jaw~~^{mandible} 12.5 mm.

Sternum: Length from carinal apex to tip of posterior lateral process 122 mm; height from carinal apex to ventral lip of coracoidal sulcus 36 mm.

Coracoid: Length from foremost ^(anterior) edge of coracohumeral surface to external tip of sternal end 42.5 mm; depth of shaft to tip of procoracoid 11.5 mm; breadth of glenoid facet 6.5 mm; length of glenoid facet 8.0 mm; distance from procoracoid ^{process procoracoid} to foramen 6.6 mm.

Humerus: Greatest length 90 mm?; breadth of proximal end across external and internal tuberosities 18 mm; proximodistal ^{height} depth of head 7 mm; length of pectoral attachment through external tuberosity 12 mm; greatest breadth of pectoral attachment 4 mm; greatest distance from distal end (externally) to point of contact of ectepicondylar prominence with shaft 12.3 mm; depth of external side of distal end 8.0 mm; depth of shaft above distal end 7.5 mm.

Ulna: Depth of distal end externally 8.0 mm.

Radius: Length 66 mm?

Carpometacarpus: External length 47.5 mm; length of process of metacarpal I 9.3 mm; depth of distal end from internal tuberosity of metacarpal II through distal metacarpal symphysis measured on right carpometacarpus 8.0 mm.

Wing phalanges: Lengths, digit I phalanx 1, 21.2 mm; digit II phalanx 1, 20.8 mm; digit II phalanx 2, 21.5 mm; digit III phalanx 1, 9.3 mm.

not clear where
this measurement
is taken

Discussion

Description.-- (As exposed on the diatomite slabs and shown in the latex molds, the left side of the skull and sternum, and the elements of the left side of the skeleton are best preserved. Certain characters shared with Uria, Alca and Pinguinus (genera which Storer, 1960, groups together in the tribe Alcini) are at once observable: sharply ridged temporal fossa of the cranium, long process of metacarpal I of the carpometacarpus, and depressed, ovoid pectoral attachment of the humerus with the external tuberosity projecting anconally. The well developed wing elements immediately distinguish the fossil specimen from the flightless Great Auk, genus Pinguinus. Distinctions from the Razorbill, genus Alca, lie in the straighter beak, less acute bend in the distal end of the humerus and narrower coraco-sternal connection. In all of these characters, as well as general proportions of the skeleton, the fossil resembles the murre, genus Uria.

Although the cranial part of the skull is incompletely preserved, the rounded posterior contour of the supraoccipital is distinguishable on the specimen, and the narrow, sharply ridged temporal fossa is visible on the latex mold. The mold also defines the extent of the short beak, which more closely resembles that of Uria lomvia lomvia than any of the adult specimens of either U.

l. arra or U. aalge at hand. The mandible depth is even greater than in U. l. arra.

The sternum has been damaged posterior to the coracoidal sulcus, and the area of the costal ridges is pushed forward and folded onto the carina so that from this point to the posterior end the dorsal surface is exposed. Because of this damage, the total length as measured on the specimen (and given above) could be as much as 10 mm less than the actual length of the sternum. The

anterior contour of the carina shows clearly in lateral view as a broad arch, in contrast to the straight contour dorsal to the forward thrust of the apex typical of the Recent species of Uria. Further distinctions lie in the more truncated tip and the more forward protruding flange. Only one specimen (of U. aalge californica) has a suggestion of these characters.

The brachial tuberosity of the coracoid is poorly shown on the right element, but is not visible on the left, which is better preserved otherwise. The glenoid facet is relatively broader than in the modern species. The scapular facet is deeper than in U. aalge and closer to U. lomvia, though more round, rather than oval. The length ~~and prominence~~ of the procoracoid resembles the condition in Recent Uria, but the projection is sharper and more upturned than in most of the specimens examined. The small foramen is well below the tip of the procoracoid; the size and position of the foramen is found to be variable in the sample of specimens of the Recent species. Although the sternal facet is not exposed on the coracoid, the shape of the coracoidal sulcus of the sternum suggests that the sternal end of the coracoid is long and narrow as in Uria, with the facet possibly even more laterally extensive than in the Recent species. This condition is in contrast to that found in the puffins, or even in Alca, in which the articular surface is shorter and deeper.

The left scapula is incompletely revealed in ventral view. Neither the acromion nor the coracoidal articulation is visible, and the shape of the glenoid facet is not clear.

The broken humerus of the left side lies with the proximal end presenting an aspect slightly lateral of anconal, while the distal fragment is turned so as to expose more of the external side.

point to this feature with an arrow on the Fig.

The proximal end of this element shows the most notable differences from the Recent species of Uria. As observed in the latex mold, the pectoral attachment is broad with a distinct flange extending below the head, narrowing the area between the attachment and the median crest, and the humeral head appears to be less sharply undercut. ^(See fig. 4) A flange in varying degrees of extent occurs in a few specimens of both U. aalge and U. lomvia, but in none is it as strongly developed or as evenly contoured as in the fossil.

The line of the anterior latissimus dorsi muscle in the fossil is as long as in Uria, but the slope is more markedly palmar and is emphasized by the more rounded anconal aspect of the shaft. Distally the external tricipital groove is sharply rimmed. The width of the internal groove is not clear, but ^{the anconal flange of the distal end as shown} appears in the latex mold ^{suggests that the internal groove is} to be broader than the external, thus resembling the condition in Uria as contrasted, for example, with Alca ^{or Australca or Pinguicula?} in which the two grooves are of equal size. The tip of the ectepicondylar process is more prominent than in most specimens of Recent Uria, ^{thus resembling Alca and Australca.} There is, however, considerable variation in the Recent series, and a few specimens approach the same prominence, though only one (of maximum length) is as elevated above the distal end and the process is less vertically placed with respect to the shaft.

The ulna and radius are crushed proximally and provide little information other than approximate length of the radius.

The external side of the complete left carpometacarpus, and the distal end of the right are exposed. In over all length as well in length of the process of metacarpal I, the element falls within the size range of U. l. arra. The rounded distal contour of metacarpal III, which is best observed in internal view on the right side, is approached in some specimens of U. lomvia.

Comparison with previously described fossil Alcidae.--

Three extinct species of Uria have been previously described, each on the basis of the humerus: Uria antiqua (Marsh 1870) from the "Miocene of North Carolina, ^{"[= Lower Pliocene, Storrs L. Olsen, pers. comm.]} U. affinis (Marsh 1872) from the Pleistocene of Maine and U. ausonia (Portis 1887) from the Pliocene of Italy. The ^{last} ~~latter~~ species is based ^a ~~on only~~ the distal end of ^{which I have not examined} the humerus. It has not been possible to make comparison with it.

A cast of the holotype of each of the other ^{two} species is available. Both are notably longer than the ^{humerus of the} holotype of Uria brodkorbi (U. antiqua 96.5 mm, U. affinis 94.8 mm as measured on the casts) with greater breadth between the pectoral attachment and the median crest. Both also have the line of the latissimus dorsi anterioris muscle paralleling the shaft as in Recent species of the genus, as contrasted with U. brodkorbi in which the muscle line slopes palmar. The U. antiqua ^{of} humerus resembles that of U. brodkorbi in the rounding of the shaft toward the proximal end, although the shaft is heavier and the apex more anconal in position in U. antiqua.

Two extinct genera are worthy of consideration in comparison with U. brodkorbi: Australca Brodkorb 1955, genotype A. grandis from the ^{Middle} Pliocene, Bone Valley Formation of Florida, and Miocepheus Wetmore 1940, genotype M. mcclungi from the ^{Middle} Miocene Calvert Formation of Maryland. The holotype of A. grandis is a coracoid, with humerus, radius, ulna, carpometacarpus and tibiotarsus referred. The holotype of M. mcclungi is a humerus. This and a later referred humerus (Wetmore, 1943) from the type locality are the only recorded specimens of Miocepheus.

Through the kindness of Dr. Storrs Olson of the National Museum of Natural History, specimens that he considers referable to Australca and Miocepphus have been made available (see Comparative Material Available above). The Australca material is similar in size to measurements given for A. grandis (Brodkorb 1955) but is not from the type locality. The Miocepphus humerus, however, comes from the type formation of M. mcclungi, though in "Zone 13" (the type is from "Zone 12."). The specimen is intermediate in size between the holotype ^(Wetmore 1940) and the referred specimen ^(Wetmore 1943) of M. mcclungi, both of which are markedly smaller than the humerus of U. brodkorbi.

As size is not a generic character, the specimens of both Australca and Miocepphus are ^{analyzed} ~~here compared with comparable elements~~ on the basis of qualitative characters.

^{not clear} In Australca the major distinction from U. brodkorbi lies ^{more posterior position of} in the ^(inset) ~~inset of~~ the procoracoid from the median edge of the coracoidal shaft. This character is clearly shown in both the referred specimen at hand and in the illustration of the holotype (Brodkorb, 1955:50 fig. 24). Comparison with U. brodkorbi with respect to this character is best ^{appreciated} ~~discerned~~ on the right coracoid, ^{of U. brodkorbi} in which the close proximity of the lower end of the procoracoid to the median edge of the shaft is discernible on the latex mold. In the Australca humerus ^{of} the area below the head is broader and the pectoral scar longer and relatively flatter than in U. brodkorbi; distally the apex of the ectepicondylar process is more prominent and forms a more acute angle with the shaft. Although the carpometacarpus resembles that of U. brodkorbi in the long process of metacarpal I, there is a less acute angle between the process and the external trochlear crest (U. brodkorbi resembles ^{Recent} Uria in this character).

the wording of the sentence makes it hard to follow

The humerus of Miocepphus ^{is similar to} suggests that of U. brodkorbi in the presence of a flange from the pectoral attachment narrowing the area below the head. The attachment itself, however, is flatter and less ovoid and the external tuberosity is less ^{prominent} anconally ^{prominent}. The line of the latissimus dorsi anterioris muscle slopes slightly palmar ^{in distal extent and does not reach the pectoral attachment proximally} but is short. Distally the ectepicondylar process is even more prominent than in Australca, and terminates in a distinct papilla.

SUMMARY AND CONCLUSIONS

to

The specimen from Lompoc as shown in the skeletal impressions, translated by latex molds into solid bones, provides a rare opportunity to study characteristics of associated fossil elements.

Viewed as a whole the skeleton resembles that of the murre, genus Uria. In relation to Recent species of the genus it appears to have been of sturdier build, with ^{the} strong sternum and short beak. Although in length of coracoid and humerus it is close in size to Uria aalge, the breadth of these elements equals or surpasses those of the larger U. lomvia arra (see Table I). The carpometacarpus closely resembles that of U. l. arra in size ^{in?} and is approached in some specimens of U. lomvia by the rounding of the distal end of MII¹.

and →

Some of the individual elements, if found isolated, might well have suggested generic distinction from Recent Uria. This is particularly true of the sternum and humerus. However, the large series of modern skeletons studied reveals trends towards one or more of the apparently distinctive characters. Though no ^{single} one Recent skeleton has a combination of characters matching those of the fossil, there is sufficient similarity within the series to indicate that it is entirely consistent that a Miocene ancestor, still within the genus, could differ in this manner.

The balance, therefore, weighs in favor of the new species being retained in the genus Uria.

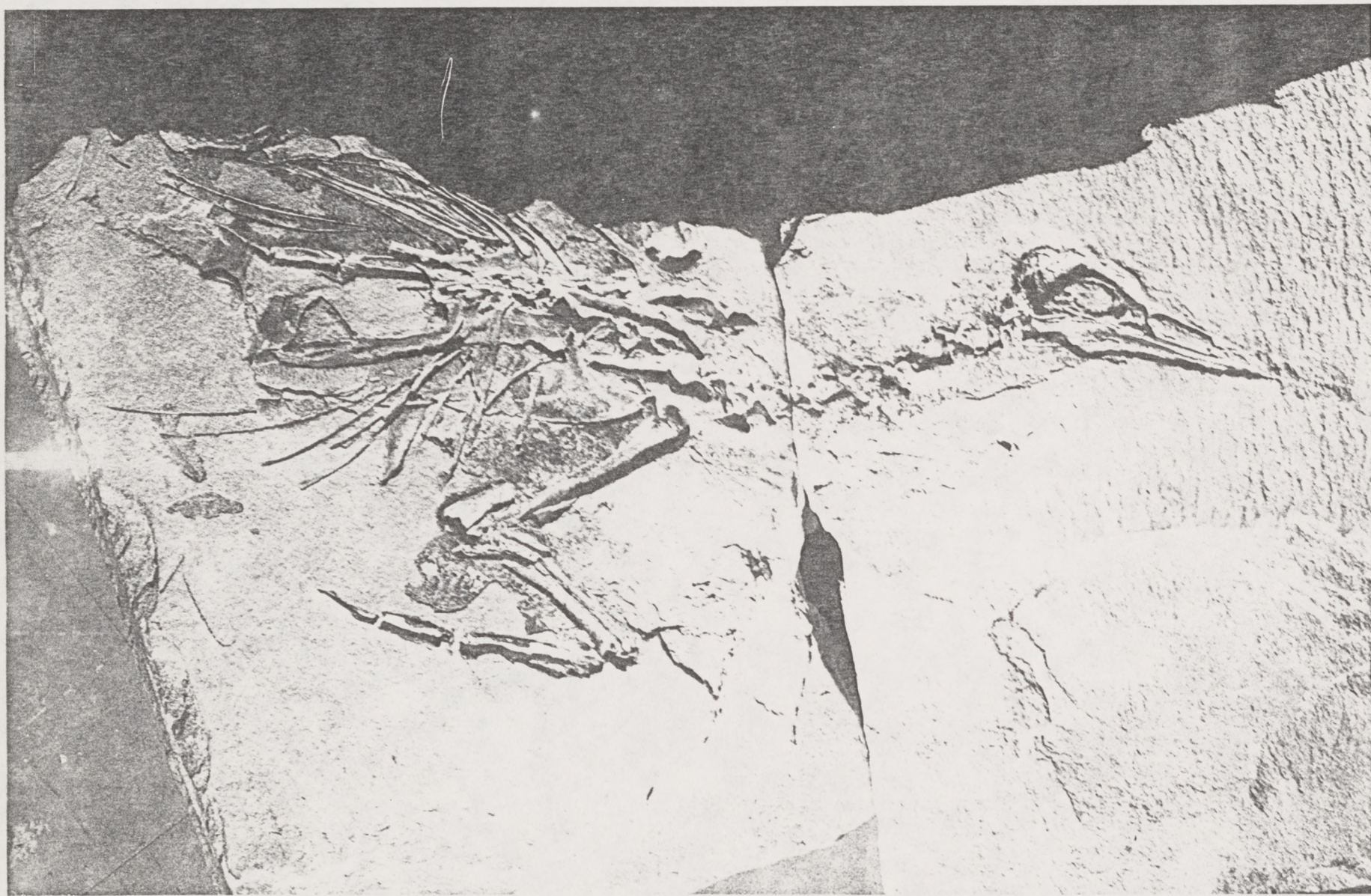
TABLE I
Measurements (in mm) of Uria brodkorbi
and Recent species of Uria*

	<u>Uria</u> <u>brodkorbi</u>	<u>U. l. arra</u> (10)		<u>U. l. lomvia</u> (2)*		<u>U. a. inorn-</u> <u>ata</u> (6)		<u>U. a. calif-</u> <u>ornica</u> (17)	
		max.	min.	max.	min.	max.	min.	max.	min.
Skull									
length	93.6	108.9	101.0	95.0		107.2	97.2	110.2	100.3
premaxilla	25.0	27.7	23.3	21.7		30.1	26.2	31.7	25.5
height of									
mandible	12.5	11.8	10.7	11.0		10.4	8.6	11.0	9.1
Coracoid									
length	42.5	47.9	44.6	41.8	41.4	42.0	41.1	43.2	39.4
breadth	11.5	12.0	10.5	11.0	9.7	11.3	10.0	11.2	10.0
breadth of									
glenoid	6.5	6.4	5.2	5.6	3.5	5.7	4.8	5.6	4.7
facet									
Humerus									
length	90+?	99.3	90.5	89.9	85.7	88.4	87.0	91.8	83.3
proximal									
breadth	18.0	18.5	17.0	17.4	16.4	17.2	16.3	17.4	16.2
height of									
ectepicon-									
dylar prom.	12.3	12.3	11.0	11.1	9.2	11.5	11.0	11.3	10.0
Carpometacarpus									
length	47.5	49.1	46.1 45.4	44.3	44.0	45.7	43.1	46.8	43.4
length M I	9.3	9.4	8.0	8.1	7.4	8.6	7.3	8.8	7.5
Radius									
length	66.?	72.2	65.8	65.3	64.0	65.2	61.8	66.4	61.0

*Numbers in parentheses indicate number of specimens measured
For U. l. lomvia, only one skull available.



(Original is much lighter) Henry's close up of latex mold of humerus Fig 4

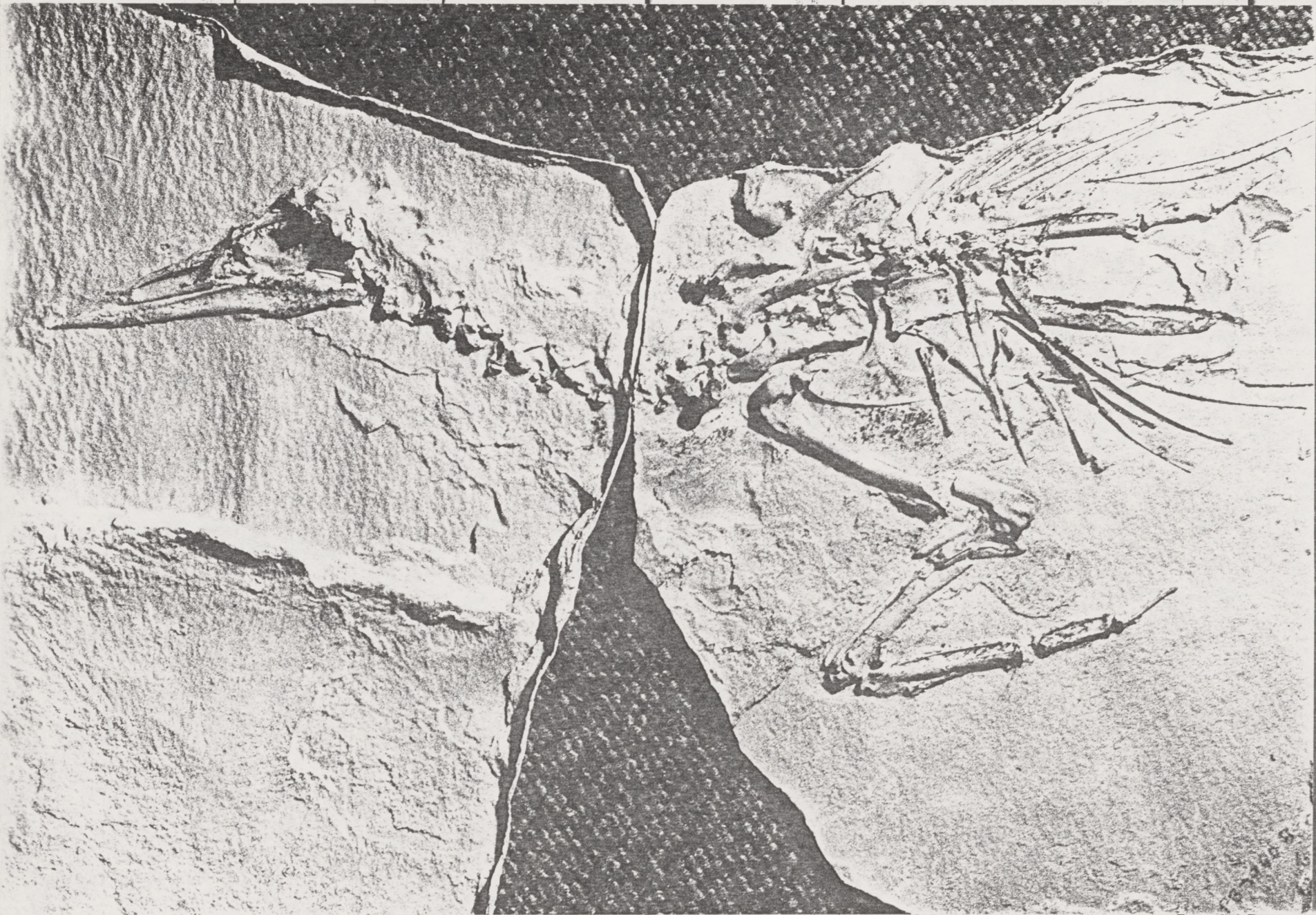


Howard Fig. 1



Natural size as here shown

Howard Fig. 2



Howard.

Fig. 3

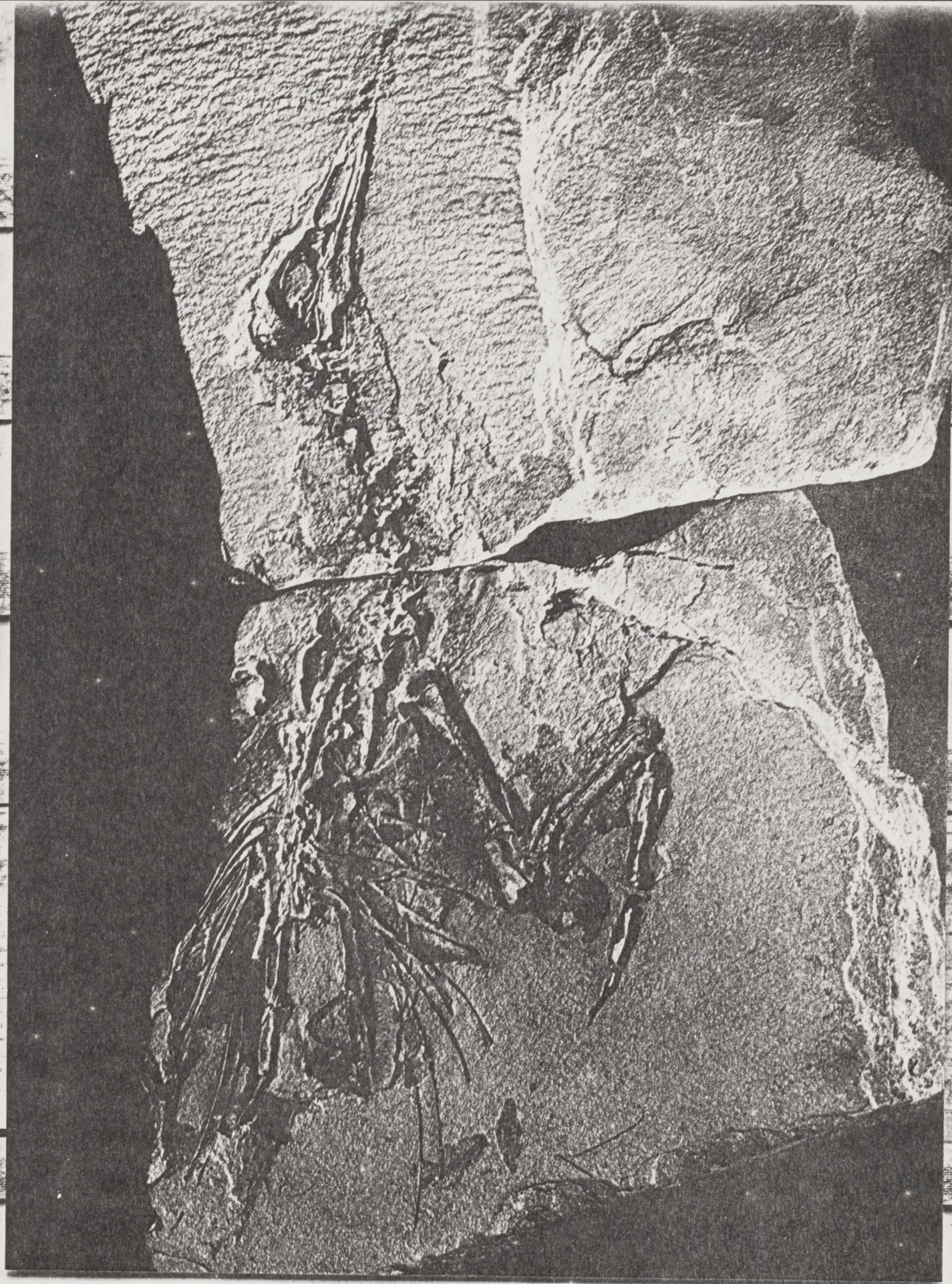


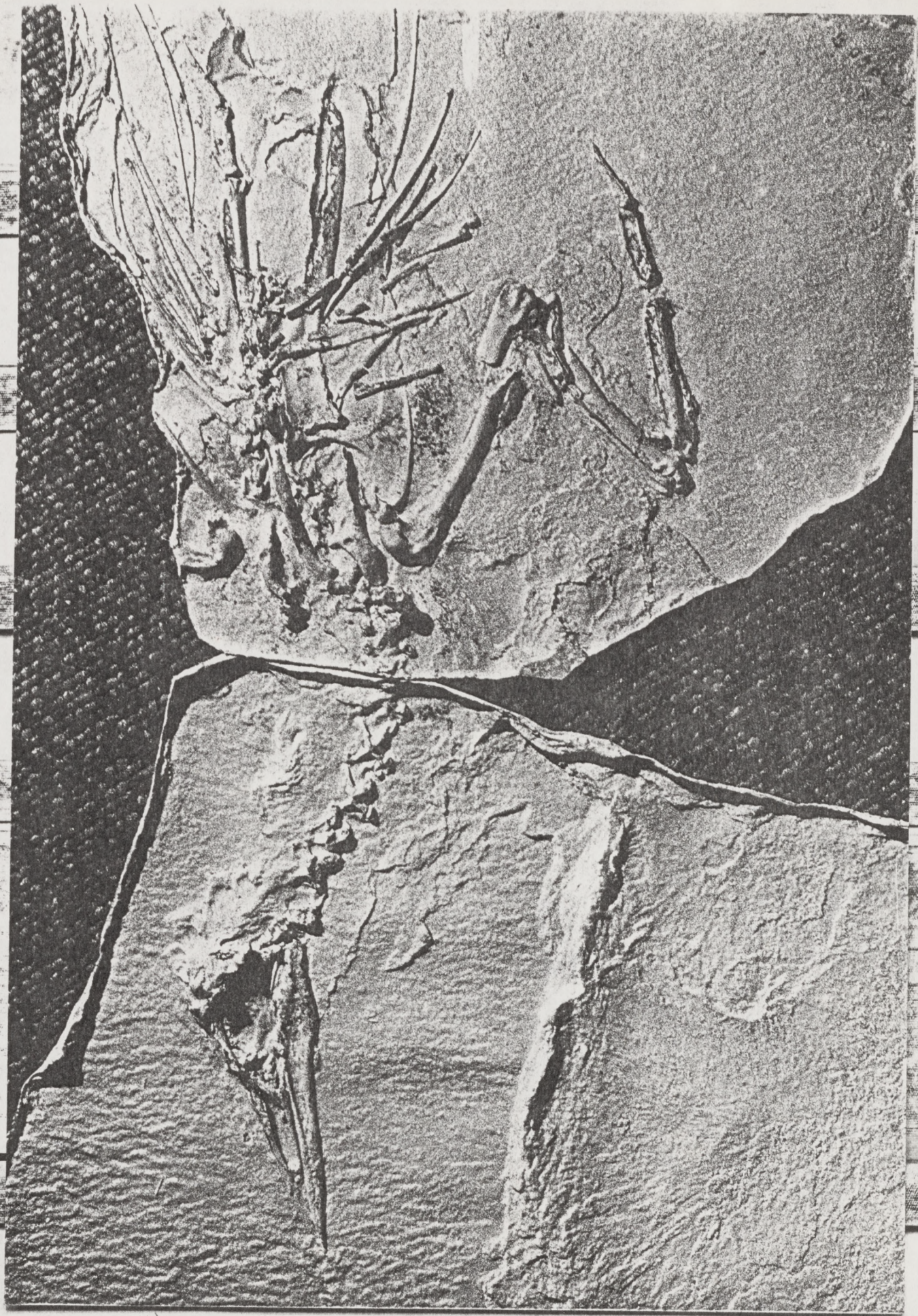
Fig 1

Fig
1

Henry's photo of two PB7960 slabs placed together [have another, lighter, one to use]



Howard | Budhark's photo of slab PB960B Fig 2



Howard
fig. 3

Howard's photo of two latex molds placed together

Fig. 3

TABLE 1

Measurements (in mm) of holotype of Uria brodkorbi
and comparable elements of U. lomvia and U. aalge*

Element	<u>U. brodkorbi</u>	<u>U. l. lomvia</u> (2)		<u>U. l. arra</u> (10)			<u>U. a. inornata</u> (6)			<u>U. a. californica</u> (17)		
		Max.	Min.	Max.	Mean	Min.	Max.	Mean	Min.	Max.	Mean	Min.
Skull												
Greatest length	93.6	95.0		108.9	104.7	101.0	107.2	102.2	97.2	110.2	104.6	100.3
Premaxillary symphysis**	25.0	21.7		27.7	25.0	23.3	30.1	28.0	26.2	31.7	28.6	25.5
Greatest height mandible	12.5	11.0		11.8	11.2	10.7	10.4	9.3	8.6	11.0	10.0	9.1
Coracoid												
External length**	42.5	41.8	41.4	47.9	45.9	44.6	42.0	41.7	41.1	43.2	40.4	39.4
Depth to procoracoid**	11.5	11.0	9.7	12.0	11.2	10.5	11.3	10.5	10.0	11.2	10.4	10.0
Breadth glenoid facet	6.5	5.6	3.5	6.4	5.6	5.2	5.7	5.3	4.8	5.6	5.1	4.7
Humerus												
Greatest length	90 approx.	89.9	85.7	99.3	93.4	86.3	88.5	87.6	87.0	91.8	87.6	83.3
Proximal breadth**	18.0	17.4	16.4	18.5	17.7	17.0	17.2	16.8	16.3	17.4	16.5	16.2
Ectepicondylar prominence**	12.3	11.1	11.0	12.3	11.6	11.0	11.5	11.2	11.0	11.3	10.9	10.0
Radius												
Length	66 approx.	65.3	64.0	72.2	68.9	65.8	65.2	62.7	61.8	66.4	63.6	61.0
Carpometacarpus												
External length	47.5	44.3	44.0	49.1	47.6	45.4	45.7	44.4	43.1	46.8	44.4	43.4
Length process metacarpal I	9.3	8.1	7.4	9.4	8.5	8.0	8.6	7.8	7.3	8.8	7.9	7.5

*Numbers in parentheses indicate number of specimens measured
(for U. l. lomvia, only one skull available)

**See MEASUREMENTS under SYSTEMATICS for explanation of areas measured

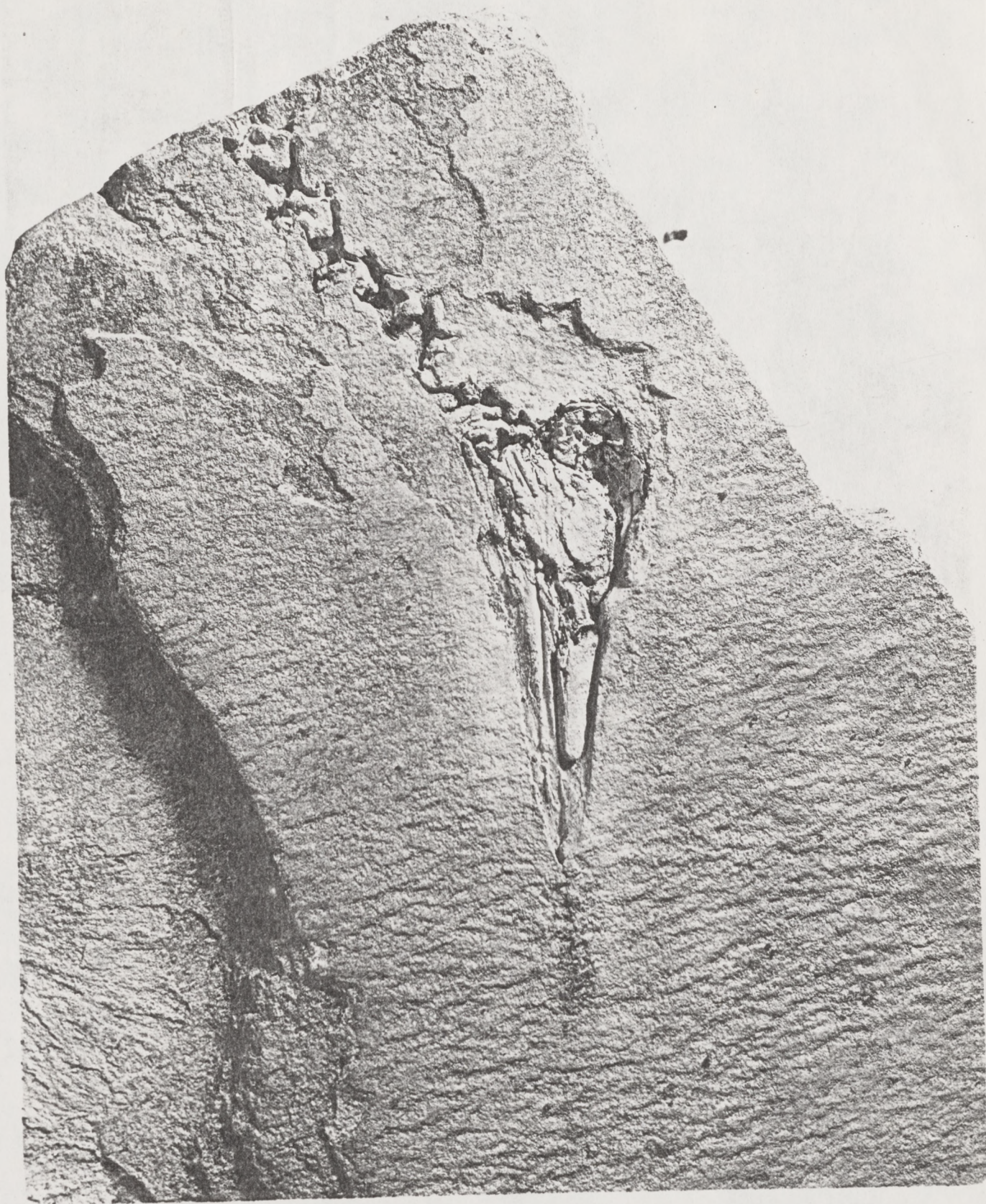
Measurements (in mm) of holotype of Uria brodkorbi

and comparable elements of U. lomvia and U. aalge*

Element	<u>U. brodkorbi</u>	<u>U. l. lomvia</u> (2)		<u>U. l. arra</u> (10)			<u>U. a. inornata</u> (6)			<u>U. a. californica</u> (17)		
		Max.	Min.	Max.	Mean	Min.	Max.	Mean	Min.	Max.	Mean	Min.
Skull												
Greatest length	93.6	95.0		108.9	104.7	101.0	107.2	102.2	97.2	110.2	104.6	100.3
Premaxillary symphysis**	25.0	21.7		27.7	25.0	23.3	30.1	28.0	26.2	31.7	28.6	25.5
Greatest height mandible	12.5	11.0		11.8	11.2	10.7	10.4	9.3	8.6	11.0	10.0	9.1
Coracoid												
External length**	42.5	41.8	41.4	47.9	45.9	44.6	42.0	41.7	41.1	43.2	40.4	39.4
Depth to procoracoid**	11.5	11.0	9.7	12.0	11.2	10.5	11.3	10.5	10.0	11.2	10.4	10.0
Breadth glenoid facet	6.5	5.6	3.5	6.4	5.6	5.2	5.7	5.3	4.8	5.6	5.1	4.7
Humerus												
Greatest length	90 ?	89.9	85.7	99.3	93.4	86.3	88.5	87.6	87.0	91.8	87.6	83.3
Proximal breadth**	12.0	17.4	16.4	18.5	17.7	17.0	17.2	16.3	16.3	17.4	16.5	16.2
Ectepicondylar prominence**	12.3	11.1	11.0	12.3	11.6	11.0	11.5	11.2	11.0	11.3	10.9	10.0
Radius												
Length	66 ?	65.3	64.0	72.2	68.9	65.8	65.2	62.7	61.8	66.4	63.6	61.0
Carpometacarpus												
External length	47.5	44.3	44.0	49.1	47.6	45.4	45.7	44.4	43.1	46.8	44.4	43.4
Length process metacarpal I	9.3	8.1	7.4	9.4	8.5	8.0	8.6	7.8	7.3	8.8	7.9	7.5

*Numbers in parentheses indicate number of specimens measured
(for U. l. lomvia, only one skull available)

*See also HEDGECOCK (1961) for explanation of abbreviations



Biodiversity photo of slab PB7960A Fig 1 A

Henry Anson Wyld

830-2486

ORDERING INSTRUCTIONS

1. Record your name, address and phone number on front.
2. Fill out order area below.
3. When submitting cut negs for printing, please use one glassine envelope per strip. Clearly indicate printing instruction on each glassine. Specify verticle or horizontal cropping & mask it.
4. Include a check or money order for total order price plus 6% tax. For orders under \$50.00 please add \$2.00 handling charge.

NORMAL ASA EXPOSED

	SPECIAL PROCESSING	
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EKTACHROME	
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KODACHROME	
------------	--

VERICOLOR	
-----------	--

KODACOLOR	
-----------	--

PLASTIC MOUNTS	
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126	20	24	36	120	220

TOTAL ROLLS	
-------------	--

☐ CUSTOM PROOFING: Price per/roll, processing included.

☐ DELUXE PROOFING: Price per/print, indicate print size in box.

ENLARGEMENTS (color negs): Machine & clarity cand. Limited to 8 x 10 & under.

MACHINE

CLARITY CAND.	
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CUSTOM CAND.	
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CUSTOM EN.	
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WALLET	3 1/2 x 5	4 x 5	5 x 5	5 x 7	8 x 10	11 x 14	16 x 20	20 x 24	20 x 30	24 x 30	30 x 40
					2	2					

5 and # 20 - 1 8x10 each / # 11 and # 17

ENLARGEMENTS (color slides):

TYPE R	
--------	--

CIBACHROME	
------------	--

4 x 5	5 x 7	8 x 10	11 x 14	16 x 20	20 x 24

☐ CUSTOM I-NEG

PRINT FINISHING	
-----------------	--

☐ COPY NEG (4 x 5)

- ☐ Mounting
- ☐ Texturing (specify pebble or linen)
- ☐ Canvas Stretcher

☐ COPY TRANSPARENCY
--

\$ CALCULATED
6.00

\$ RECEIVED
ea

\$ CREDIT
.

\$ C.O.D.
.

66724

(wed) June 18

The liability of Color Specialist's for the damage or loss of any film shall be limited to the replacement of a like amount & type of unexposed film.

8x10's

neg # 5
neg # 20

6x7

neg # 11
neg # 17

NORMAL ASA EXPOSED

☐	SPECIAL PROCESSING	☐	EKTACHROME	☐	KODACHROME	☐
--------------------------	--------------------	--------------------------	------------	--------------------------	------------	--------------------------

VERICOLOR	☐	KODACOLOR	☐	PLASTIC MOUNTS	☐
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126	20	24	36	120	220		TOTAL ROLLS	☐
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☐ CUSTOM PROOFING: Price per/roll, processing included.

☐ DELUXE PROOFING: Price per/print, indicate print size in box.

ENLARGEMENTS (color negs): Machine & clarity cand. Limited to 8 x 10 & under.

MACHINE	CLARITY CAND.	☐	CUSTOM CAND.	☐	CUSTOM EN.	☐
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WALLET	3 1/2 x 5	4 x 5	5 x 5	5 x 7	8 x 10	11 x 14	16 x 20	20 x 24	20 x 30	24 x 30	30 x 40
					2	2					

5 and # 20 - 1 8x10 each / # 11 and # 17

ENLARGEMENTS (color slides):

TYPE R	☐	CIBACHROME	☐
--------	--------------------------	------------	--------------------------

4 x 5	5 x 7	8 x 10	11 x 14	16 x 20	20 x 24

☐ CUSTOM I-NEG	PRINT FINISHING	☐
---------------------------------------	-----------------	--------------------------

☐ COPY NEG (4 x 5)	☐ Mounting
☐ COPY TRANSPARENCY	☐ Texturing (specify pebble or linen)
	☐ Canvas Stretcher

\$ CALCULATED	\$ RECEIVED	\$ CREDIT	\$ C.O.D.
6.00	ea	.	.

66724

(wed) June 18

The liability of Color Specialist's for the damage or loss of any film shall be limited to the replacement of a like amount & type of unexposed film.

COLOR SPECIALISTS, INC.

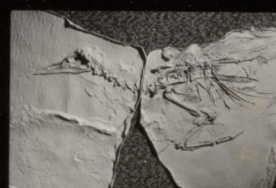
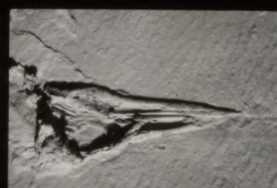
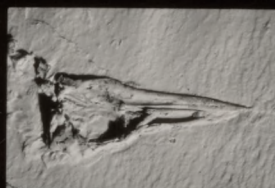
25801 OBRERO
MISSION VIEJO, CA 92691

TY FILM 5062

KODAK SAFETY FILM 5062

KODAK SAFETY FILM 5062

KODAK SAFETY FILM 5062



6

→16A

→17

→17A

→18

→18A

→19

→19A

→20

→20A

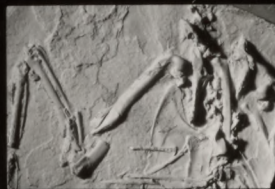
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KODAK SAFETY FILM 5062

KODAK SAFETY FILM 5062

KODAK SAFETY FILM 5062

KODAK SAFE



3

→10A

→11

→11A

→12

→12A

→13

→13A

→14

→14A

→15

→15A

→1

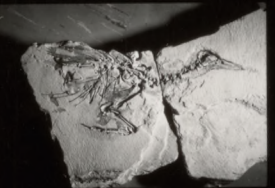
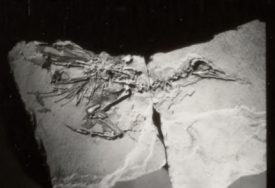
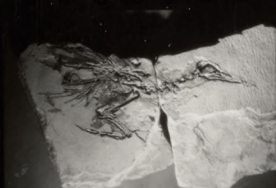
TY FILM 5062

KODAK SAFETY FILM 5062

KODAK SAFETY FILM 5062

KODAK SAFETY FILM 5062

KODAK SAFETY FILM 5062



4

1 7 5

→5

→5A

→6

→6A

→7

→7A

→8

→8A

→9

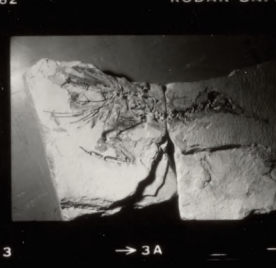
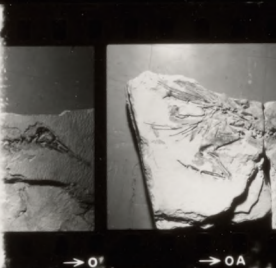
→9A

→10

KODAK SAFETY FILM 5062

KODAK SAFETY FILM 5062

KODAK SAFE



→0

→0A

→1

→1A

→2

→2A

→3

→3A

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